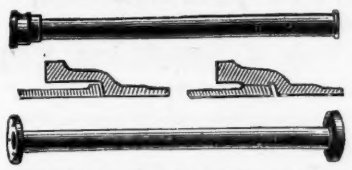
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1873.] LONDON, APRIL 4, 1899. [51ST YEAR. PRICE 6d.

GAS AND WATER PIPES

1½ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bonlea Foundry,

SOUTH STOCKTON-ON-TEES.

Formerly Springbank Iron-Works, Glasgow.

ESTABLISHED 1848.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

Telegrams: "BONLEA, STOCKTON-ON-TEES."

INCANDESCENT MANTLES

(Pure White Light).

THE BEST AND CHEAPEST IN THE WORLD

Are Manufactured by

OBERFELT & CO.,

CHARLOTTENSTR., 82, BERLIN.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

PARKER & LESTER,

Manufacturers & Contractors.

GAS-LEAK INDICATOR.

For Particulars and Price apply to

ORMSIDE STREET, LONDON, S.E.

ESTABLISHED 1830.

ROBERT MARSHALL;

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

NORTON'S PATENT

"ABYSSINIAN" & ARTESIAN TUBE WELLS,

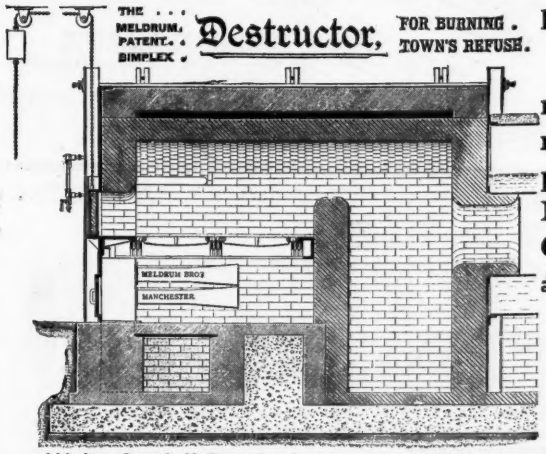
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.

The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.

LE GRAND & SUTCLIFF,

HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

THE Utilization of Towns' Refuse for some practical purpose has been successfully solved; and there is, therefore, no reason why every township should not have its own Electric Light Installation, and obtain all the power from its Dust-Bins.



At Hereford City the Sewage Farm is now worked entirely with power from refuse, 1¼ million gallons being pumped per day, besides Sludge-Presses, Sludge-Pumps, and Lime-Mixers—the saving in Cost of Coal (not now used) being about £300 per annum.

AN INSTALLATION ON SIMILAR LINES NOW ON ORDER FOR HUNSTANTON WATER-WORKS.

Write for full Particulars, stating Weight of Refuse per annum, and for what purpose you would wish to use the Power, when we shall be glad to submit a suitable Scheme.

MELDRUM BROS., ATLANTIC WORKS, **MANCHESTER.**

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

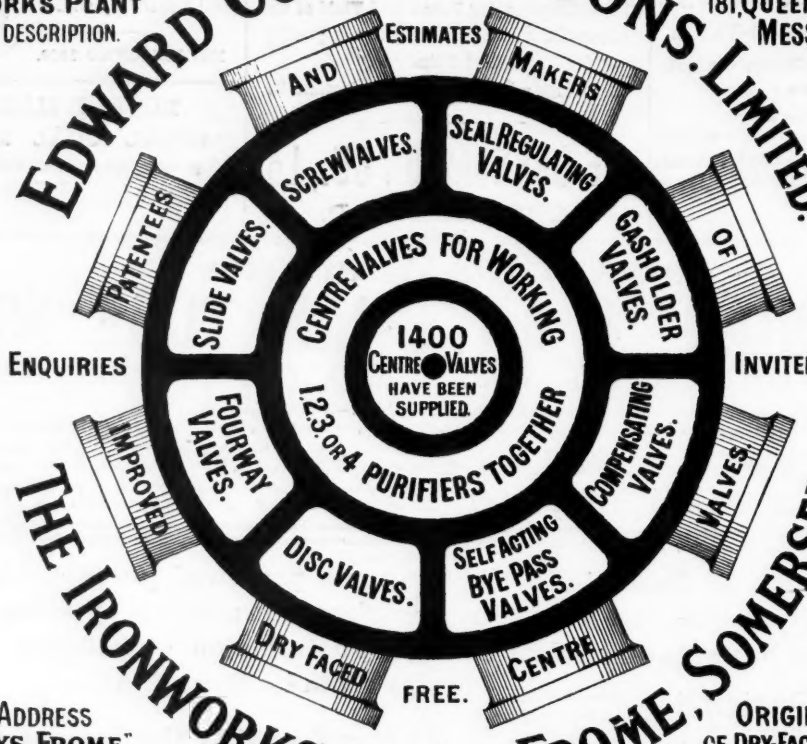
PATENT ADJUSTABLE OVERFLOWS.

ENGINEERS & CONTRACTORS FOR GAS WORKS PLANT OF EVERY DESCRIPTION.

LONDON OFFICE + BRIDGE HOUSE 181, QUEEN VICTORIA ST E.C. MESSRS BALE & HARDY, AGENTS.

PATENT WASHERS

PATENT COMBINED BYE-PASS & COMPENSATOR FOR EXHAUSTERS.



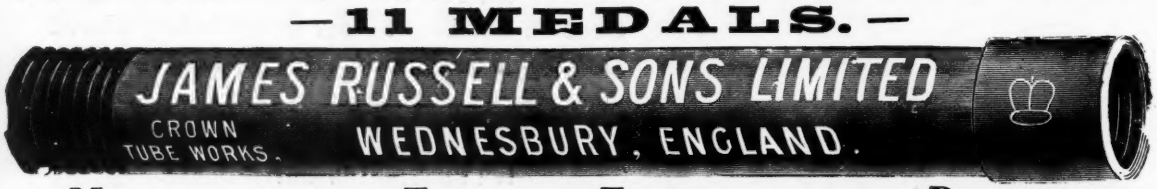
TELEGRAPHIC ADDRESS "COCKEYS FROME" "DAMPER LONDON"

ORIGINAL MAKERS OF DRY-FACED CENTRE VALVES. ESTABLISHED OVER HALF A CENTURY.

PATENT FIRE DOORS & FRAMES.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

— 11 MEDALS. —



MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

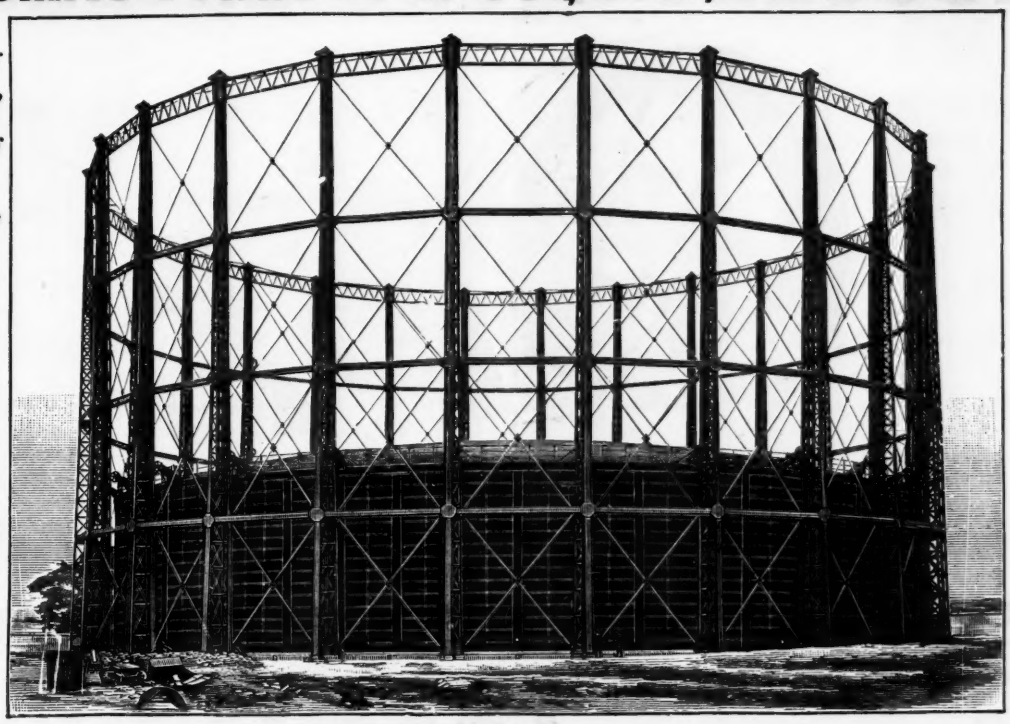
SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. MANCHESTER: 33, King Street West. BIRMINGHAM: 114, Colmore Row, LEEDS: 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT. FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS BIRMINGHAM.

WELDED & RIVETED PIPES, FOUL MAINS, RETORT. LIDS, WROT & CAST TANKS, PURIFIERS.

MANUFACTURERS OF

Humphreys & Glasgow's Patent Carburetted Water-Gas Plant.

INSTALLATIONS HAVE ALREADY BEEN SUPPLIED, AND ARE IN HAND FOR THE FOLLOWING GAS-WORKS: COPENHAGEN, BELFAST, GLASGOW, BRUSSELS, SANTIAGO, SWANSEA, TOTTENHAM, LIVERPOOL, BRIGHTON, BATH, PRESTON, SOUTHPORT, NEW YORK, NEWBURGH (N.Y.), NEWBURGH (SECOND CONTRACT), HOYLAKE, BELFAST (SECOND CONTRACT), EDINBURGH, TOTTENHAM (SECOND CONTRACT), WINCHESTER, MANCHESTER, BRUSSELS (SECOND CONTRACT), ST. JOSEPH (MO.), HOLYOKE (MASS.), SHANGHAI, STOCKTON, STOCKPORT, NORWICH, GUILDFORD, SYRACUSE, BORDENTOWN, LEA BRIDGE, COVENTRY, COMMERCIAL, BRENTFORD, BRIDLINGTON, MIDDLESBROUGH, CROYDON, L. & N. W. RAILWAY CREWE, NINE ELMS, BROMLEY, COVENTRY (SECOND CONTRACT), TAUNTON, ROTTERDAM, DORKING, LEA BRIDGE (SECOND CONTRACT), LIVERPOOL (SECOND CONTRACT), SCARBOROUGH, DURHAM, PERTH (WESTERN AUSTRALIA), COMMERCIAL (SECOND CONTRACT), COMMERCIAL (THIRD CONTRACT), MAIDENHEAD, EPSOM, NORTH MIDDLESEX, BREMEN, WANDSWORTH, FALMOUTH, AARHUS, SOUTHAMPTON, COPENHAGEN (SECOND CONTRACT).

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

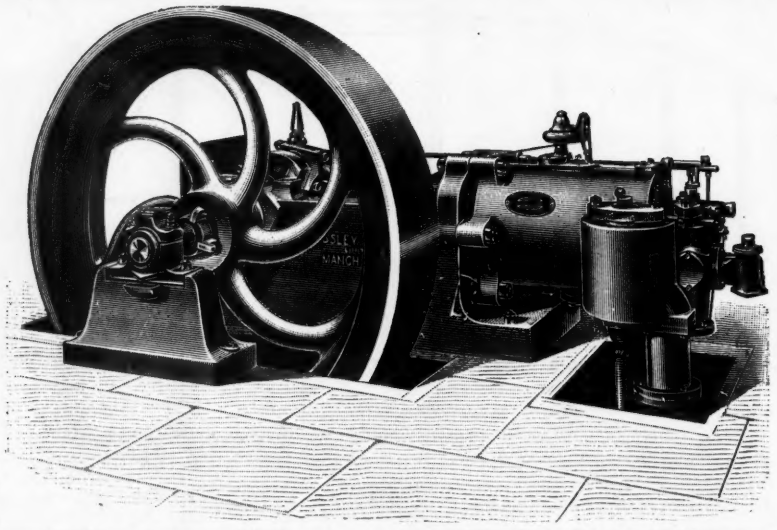
Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.

Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents,

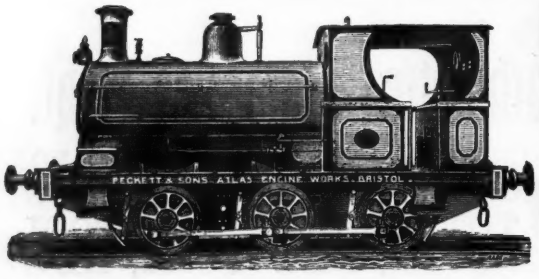
Telegraphic Address: "PARKER, LONDON."

CROSSLEY'S GAS-ENGINES



Represents 16-horse power and 20-horse power nominal High-Speed Electric Light Engines.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for Immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT, BRISTOL."

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

Manufacturers of every description of

PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

CONDENSERS, SCRUBBERS, and WASHERS.

PURIFIERS with Planed Joints a Speciality.

Patent CENTRE-VALVES, RACK and SCREW VALVES, WOOD GRIDS, and SCRUBBER-BOARDS, CAST-IRON MAINS, and SPECIALS.

STRUCTURAL WORK, COLUMNS, GIRDERS, and ROOFING.

GASHOLDERS, Cast-Iron or Steel Tanks.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (Special Quality) for Engine Cylinders, GAS COAL famous for its UNRIVALLED EXCELLENCE.

WELSBACH INCANDESCENT GAS-LIGHT.

NEW WELSBACH BURNERS.

25 Candles per Cubic Foot of Gas.

This is the Burner exhibited at Niagara Hall, London, and throughout the Provinces.

The New Welsbach Burner is used without a Chimney.

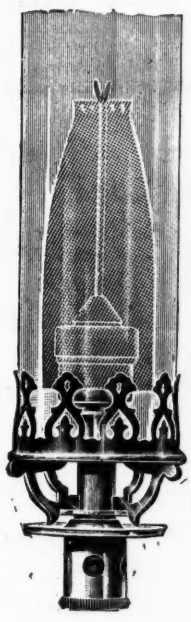
Suitable for Indoor and Outdoor Lighting

Supplied in SIX Sizes,

Consuming from $\frac{3}{4}$ to 7 Cubic Feet of Gas per Hour.

Price from 5/- upwards.

MANTLES from 9d. each.

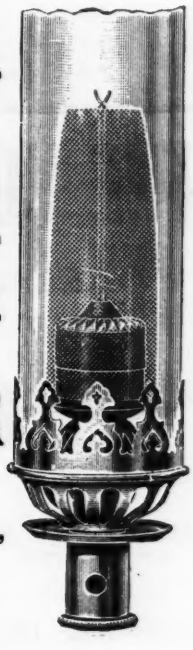


"C" WELSBACH BURNER.

REDUCED PRICES.

"C" Ordinary Burner, 5s. 0d.

"C" Bye-Pass Burner, 6s. 6d.



THE "YORK" WELSBACH BURNER

A CHEAP FORM OF THE "C" BURNER.

50 to 60 Candle Power with $3\frac{1}{2}$ to $3\frac{3}{4}$ Cubic Feet of Gas,

Price complete with MANTLE and CHIMNEY, 4/-.

MANTLES FOR "YORK" BURNER, 1/- EACH.

ALL THE ABOVE PATTERNS CAN NOW BE SUPPLIED.

Complete Price List on Application.

The Welsbach Incandescent Gas-Light Co., Ltd.,

York Street and Palmer Street, WESTMINSTER,

LONDON, S.W.

GIBBONS BROTHERS, LIMITED,

Telegraphic Address:
"GIBBONS, DUDLEY."

DUDLEY,

Telephone:
No. 8013.

GAS ENGINEERS, CONTRACTORS, RETORT SETTERS.

Patent REGENERATIVE SETTINGS,

GIBBONS & MASTERS' PATENT No. 1269, 1893.

SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

RETORT-BENCH IRONWORK, CONDENSERS,

SCRUBBERS, PURIFIERS, VALVES, &c.

DESIGNS AND ESTIMATES ON APPLICATION.

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE.

MAKERS OF

GASHOLDERS & GAS PLANT,

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES,
PIPES, LAMP PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

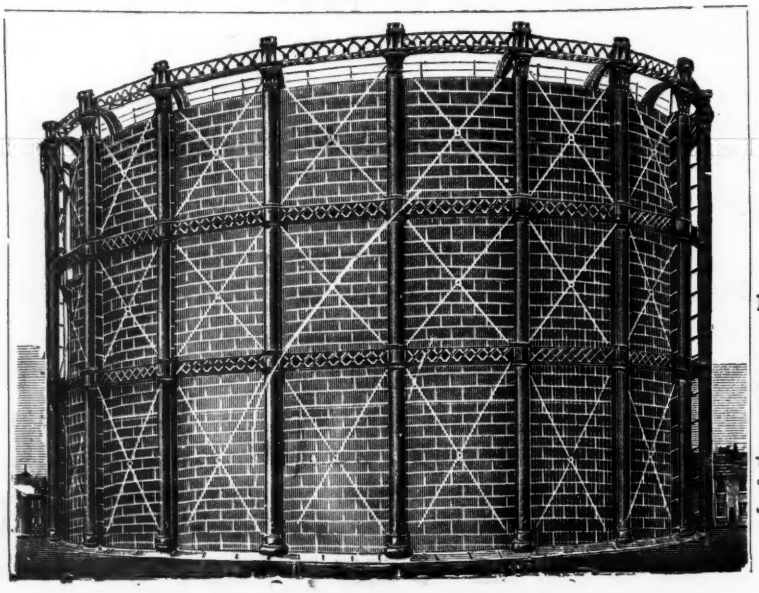
STRUCTURAL IRON

AND STEEL WORK.

BRIDGES,

ROOFS,

PIERS, ETC.



WORKS AND HEAD OFFICE:
TIPTON,
STAFFORDSHIRE.

LONDON OFFICE:
11, VICTORIA ST.
WESTMINSTER.

TELEGRAPHIC ADDRESSES:
"HORSELEY, TIPTON."
"GALILEO LONDON.

Some of the Gas-Works and Local Authorities using Crosbie's Manufactures.

Aberdovey	Clitheroe
Abergavenny	Cobham
Airedale	Coleshill
Aldridge	Collingham
Alfreton	Colney Hatch
Antrim	Colombo
Armagh	Coventry
Ascot	Cranbrook
Audley	Cullen
Aylsham	Deddington
Ballymena	Dewsbury
Ballyshannon	Dover
Beaumaris	Downpatrick
Bentham	Droitwich
Bewdley	Durban
Biddulph	Dursley
Bideford	East Ardsley
Birmingham	Eastbourne
Blackburn	Elland
Blackwell	Ellesmere
Bognor	Ellstree
Bollington	Ennis
Boreham	Eye
Bournemouth	Farnham
Bradley Green	Felixstowe
Bramham	Flint
Brandon	Garn
Bridgnorth	Garston
Broadgreen	Garw
Broadstairs	Gillingham
Bromsgrove	Gorey
Broughty Ferry	Halesowen
Builth	Hanley
Burton	Hendon
Buxton	Hereford
Calne	Hinckley
Cannock	Holywood
Cape Town	Honiton
Carlow	Hoylake
Castleford	Huddersfield
Chester-le-Street	Huelva
Chesterton	Huntingdon
Chipping Wycombe	Hythe
Cleveland	Ilkeston
	Irthlingboro'

PAINTS FOR GAS-WORKS. PAINTS FOR GASHOLDERS.

Contractors to Her Majesty's Government, the Indian Government, the Natal Government, the Turkish Government, the Netherlands Railway, the London County Council, &c., &c.

CROSBIE'S PAINTS.

Guaranteed genuine and free from adulteration, and specially made to withstand Gaseous Fumes.

Catalogue and Testimonials on Application.

ADOLPHE CROSBIE, LTD.,

COLOUR WORKS, WOLVERHAMPTON.

Some of the Gas-Works and Local Authorities using Crosbie's Manufactures.

Johannesburg	Richmond
Kegworth	Rochester
Kildwick	Roscommon
Kilrush	Rugeley
Kineton	Sandgate
Kirkburton	Scarborough
Knutsford	Seaham Harbour
Leamington	Seisdon
Ledbury	Shifnal
Leek	Shipston-on-Stour
Leven, N.B.	Sidmouth
Limerick	Skibbereen
London	Slough
Loughborough	Southam
Lymington	Southend
Machynlleth	Stafford
Merthyr Tydfil	St. Albans
Milborne Port	Stamford
Minster	Storrington
Monte Video	Strood
Napier (N.Z.)	Stroud
New Mills	Sudbury
Newnham	Swinton
North Middlesex	Tetbury
Odiham	Tokio
Ogmore	Uppingham
Outlane	Uttoxeter
Parconstown	Ventnor
Pembroke	Warwick
Penmaenmawr	Wexford
Pietermaritzburg	Wigston
Portadown	Willenhall
Port Elizabeth	Witney
Portrush	Wollaston
Portsmouth	Wolverhampton
Pwllheli	Workington
Ramsey	Wotton
Raunds	

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

OVER 60 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas and Oils suitable for the Enrichment of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

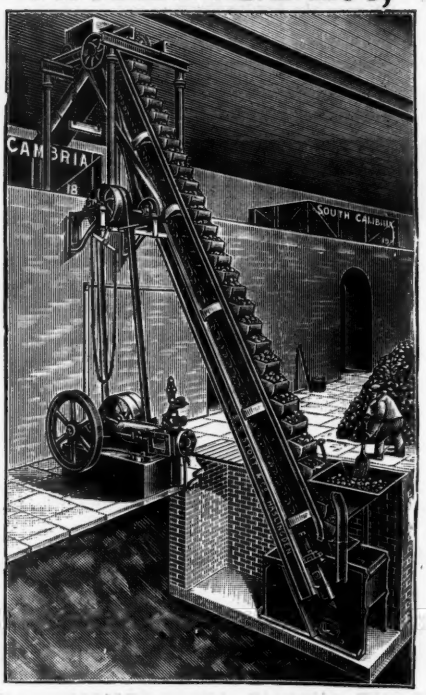
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

S. CUTLER AND SONS, MILLWALL, LONDON.

CARBURETTED WATER-GAS PLANT.

ADOPTED AT

HORNSEY.
HASTINGS.
SOUTHEND.
FOLKESTONE.
BEXHILL.
BUENOS AYRES.
SOUTHALL.
PLYMOUTH.
HARROW.
HORSHAM.

SECOND ORDERS.

SOUTHEND.
PLYMOUTH.
SOUTHALL.

GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

HAS BEEN ADOPTED FOR MANY IMPORTANT HOLDERS.

IT IS STRONG AND CHEAP, AND REQUIRES NO PIERS FOR ITS SUPPORT.

INCLINED RETORTS
UP-TO-DATE FURNACES
AND SETTINGS.

J. & H. ROBUS, 20, Bucklersbury, London, E.C.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "EVANS, WOLVERHAMPTON." PLEASE APPLY FOR CATALOGUE No. 8. National Telephone No. 7089.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

NO TAPPETS.

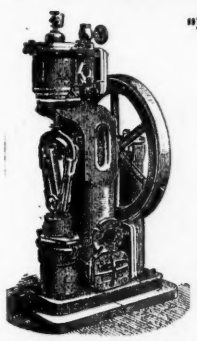


Fig. 705. "SINGLE RAM" STEAM-PUMP.

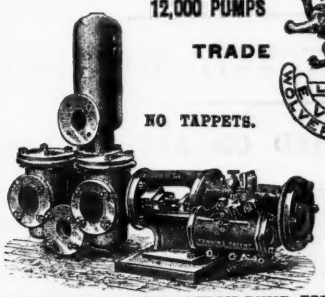


Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

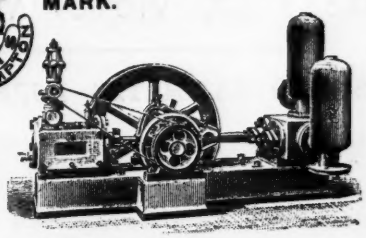


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

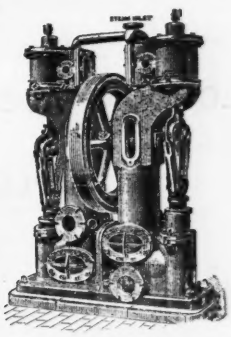


Fig. 713 "DOUBLE-RAM" STEAM-PUMP.

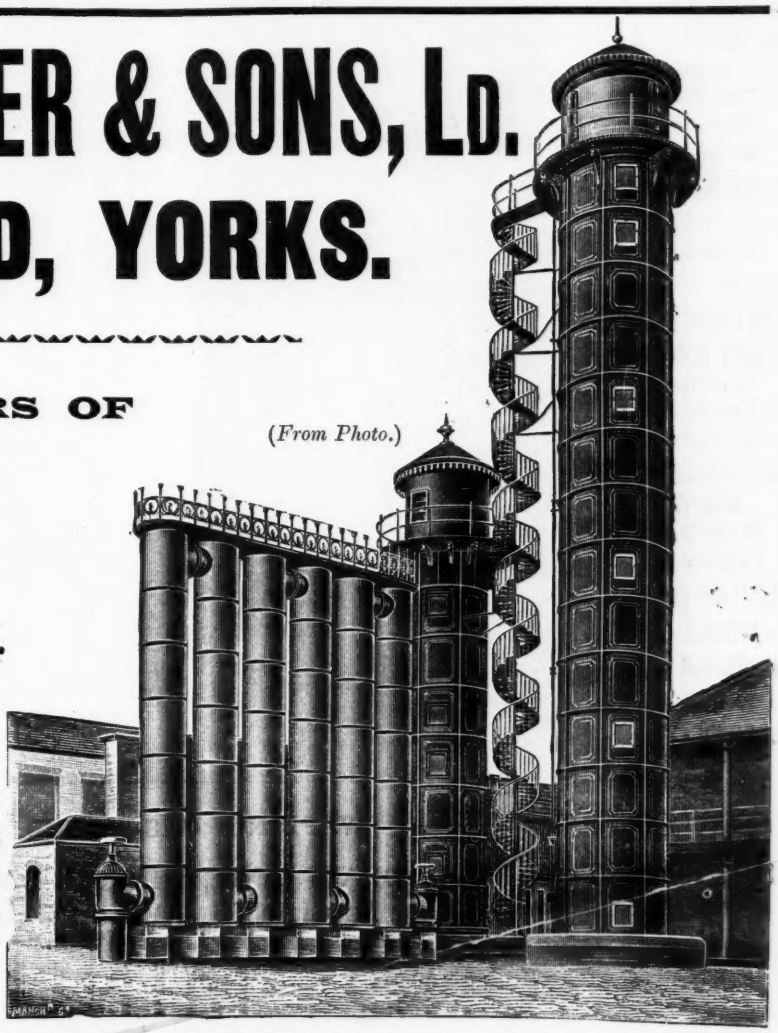
R. DEMPSTER & SONS, LD.
ELLAND, YORKS.

MANUFACTURERS OF

GAS PLANT

OF EVERY DESCRIPTION.

(*From Photo.*)



View illustrating Condensing and Scrubbing Plant erected for the Accrington Gas and Water Board by R. D. & Sons, Ltd.

C. HARRISON, Esq., Engineer.

ARROL-FOULIS
PATENT HYDRAULIC MACHINERY
FOR
CHARGING AND DRAWING GAS-RETORTS

SIR WILLIAM ARROL & CO., Ltd., Sole Makers,
DALMARNOCK IRON-WORKS, BRIDGETON,
GLASGOW.

LONDON ADDRESS: 32, VICTORIA STREET, WESTMINSTER, S.W.

PLANS AND ESTIMATES FURNISHED ON APPLICATION.

THE
ARROL-FOULIS
MACHINES
Are Employed at the following Works—

GLASGOW GAS-WORKS—
Tradeston.
Dawsholm.
Dalmarnock.

GASLIGHT & COKE COMPANY—
Beckton.

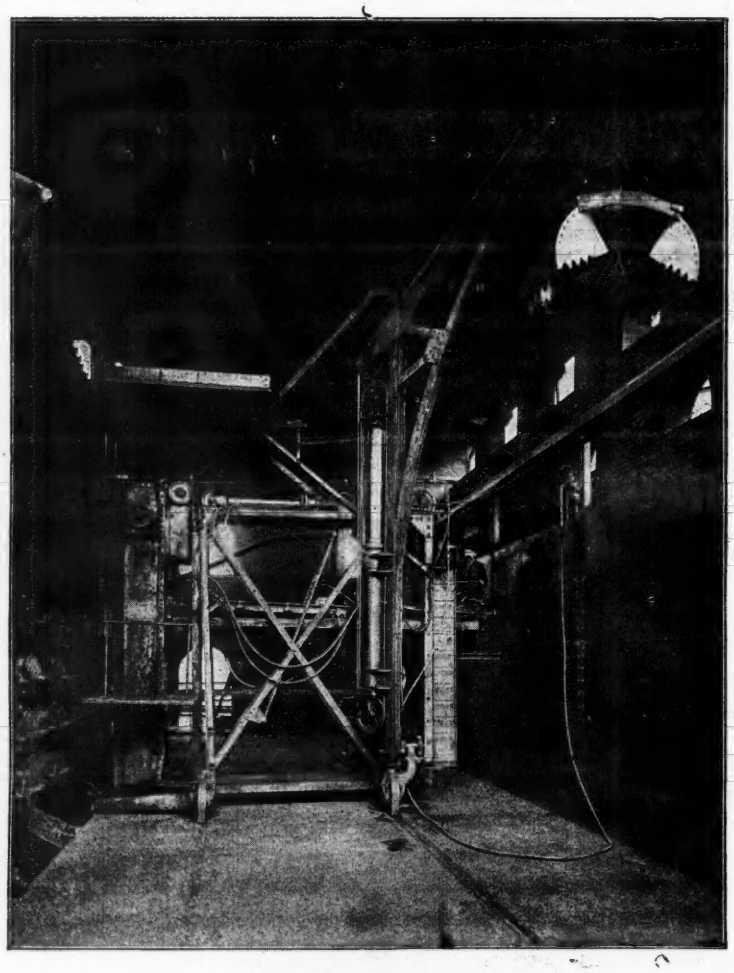
SOUTH METROPOLITAN GAS COMPANY—
East Greenwich
Vauxhall.
Rotherhithe.

COMMERCIAL GAS-WORKS—
Wapping.
Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

LIVERPOOL GAS-WORKS.



THE
ARROL-FOULIS
MACHINES
Are Employed at the following Works—

LEEDS GAS-WORKS.

BIRMINGHAM GAS-WORKS.

BRITISH GAS CO.—
Hull.

BOLTON GAS-WORKS.

IMPERIAL CONTINENTAL GAS ASSOCIATION—
Amsterdam.
Vienna.

HAGUE CORPORATION GAS-WORKS—
Hague.

METROPOLITAN GAS-WORKS—
Melbourne.

CLEVELAND GAS-WORKS—
Cleveland, Ohio,
&c., &c., &c.

OVER 200 MACHINES ARE AT WORK OR IN COURSE OF CONSTRUCTION.

WAPPING GAS-WORKS.

THE TIME TAKEN TO DRAW AND CHARGE EACH RETORT BY THESE MACHINES AVERAGES

ONE MINUTE.

THE

SUNLIGHT

INCANDESCENT GAS-BURNER

NEW POPULAR PRICES.

Burners, complete with Mantle, Chimney, and Peg, from 2/10 each.

Burners, " " " with Bye-Pass, from 4/6 each.

Mantles, Sunlight Tinted, Natural in light, Soft in tone . 9/- per doz.

Mantles, " White, just put on the Market . . 12/- per doz.

SPECIAL NOTICE!!!

Sunlight WHITE Mantles

are NOT Infringements of Welsbach or any other Patent, but are made under a Series of independent Patents, and by an entirely New Process.

We give you an absolute indemnity against all loss, damage, or expense. If, therefore, there is any attempted molestation, do not be intimidated, but communicate at once, at OUR Expense, with our Solicitor, Mr. Hugh C. Godfray, 42, Finsbury Square, London, E.C., who will immediately relieve you of all responsibility and trouble in the matter.

BRANCHES AND AGENCIES EVERYWHERE.

Price Lists, &c., on application.

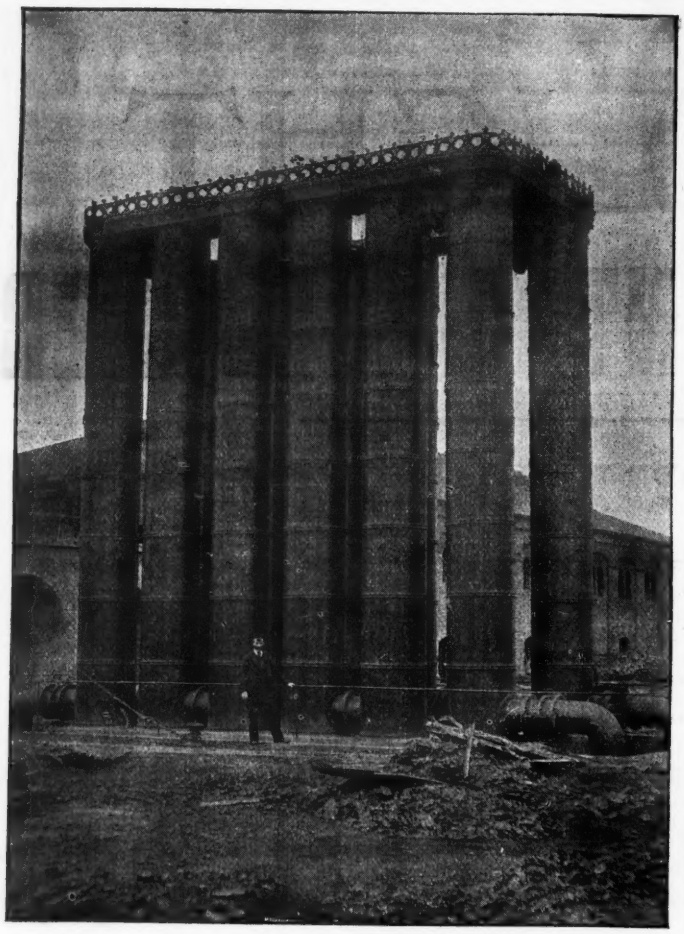
THE

NEW INCANDESCENT (SUNLIGHT PATENT) GAS LIGHTING CO., LIMITED,

33 & 34, SHOE LANE, LONDON.

Telegrams: "IGNIFLUOUS." Telephone No. 947 Holborn.

A.B.C. Code used.



A Set of Twelve Condensers, 3 ft. 6 in. diameter by 30 ft. high. *From a Photograph.*

W. C. HOLMES & Co.

MAKERS OF

Retort Ironwork, Patent Scrubber-Washers, Purifiers, Gasholders of all Sizes,

AND

Gas Plant and Structural Ironwork of every description.

CATALOGUES SENT POST FREE ON APPLICATION.

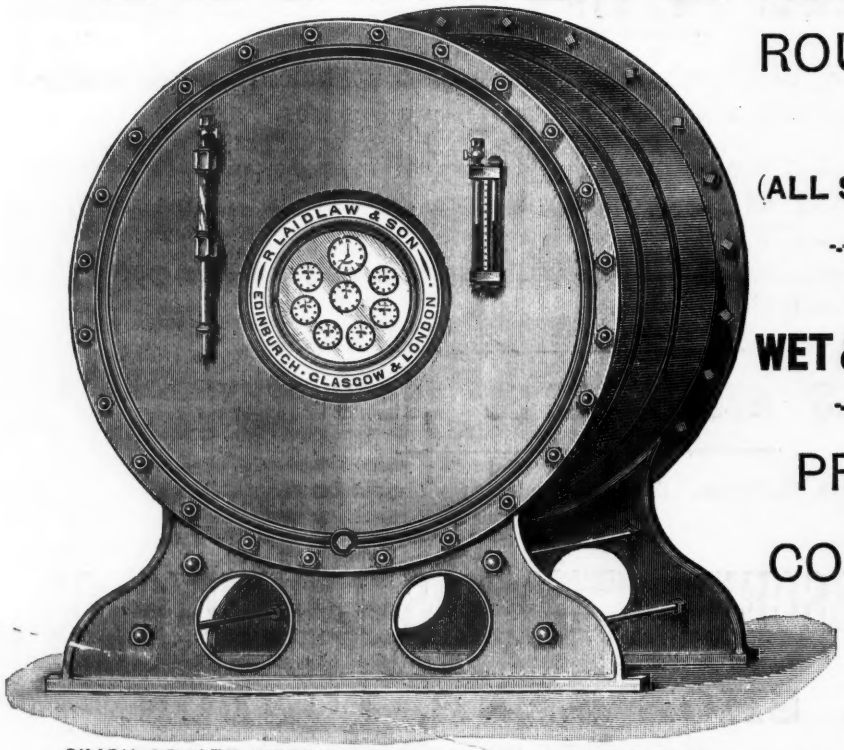
Whitestone Iron-Works,

HUDDERSFIELD.

Telegrams: "Holmes, Huddersfield;" "Ignitor, London."

R. LAIDLAW & SON

GAS & WATER ENGINEERS.



ROUND OR SQUARE STATION (ALL SIZES) METERS.

CONSUMERS'

WET & DRY GAS-METERS.

PREPAYMENT AND COMPENSATING METERS.

SIMON SQUARE WORKS, **EDINBURGH.** | ALLIANCE FOUNDRY, **GLASGOW.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

AMERICAN GAS OIL

SOLE IMPORTERS—

ANGLO-AMERICAN OIL COMPANY, LIMITED,

This well-known quality of Oil is used at most of the Corporation Works and Companies' Works throughout the United Kingdom. Contracts have also been entered into with several of the large Railway Companies.

LARGE STOCKS. PROMPT DELIVERY.

Stock of about 30,000 Tons is usually carried by us at our Installations at Avonmouth, Birkenhead, Barrow, Manchester, and London.

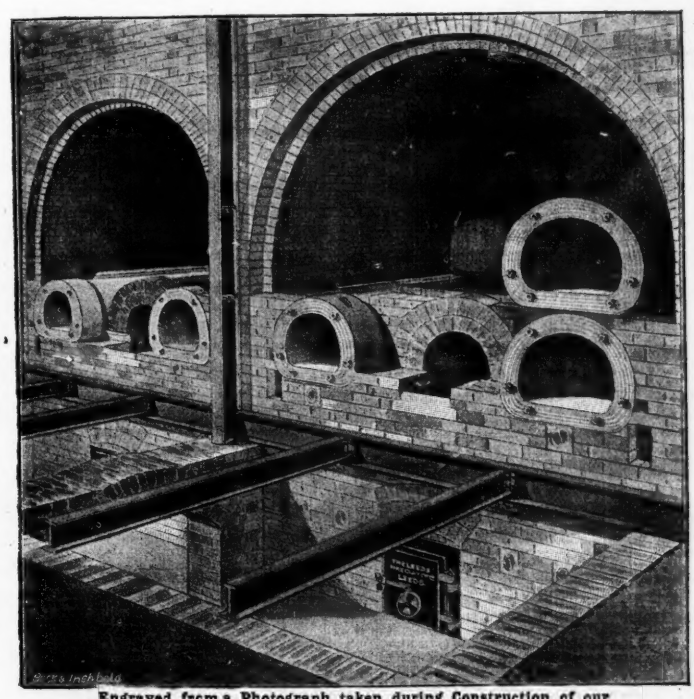
HEAD OFFICE:

22, BILLITER STREET, LONDON, E.C.

THE LEEDS FIRE-CLAY CO., LD., ENGINEERING DEPARTMENT

Telegrams:
"SETTINGS, LEEDS."
Telephone: No. 612.

WORTLEY, LEEDS.



Engraved from a Photograph taken during Construction of our Shallow Regenerator Settings.

RETORT-SETTINGS

OF EVERY DESCRIPTION
INCLINED, HORIZONTAL,
REGENERATOR, GENERATOR,
and DIRECT FIRED.

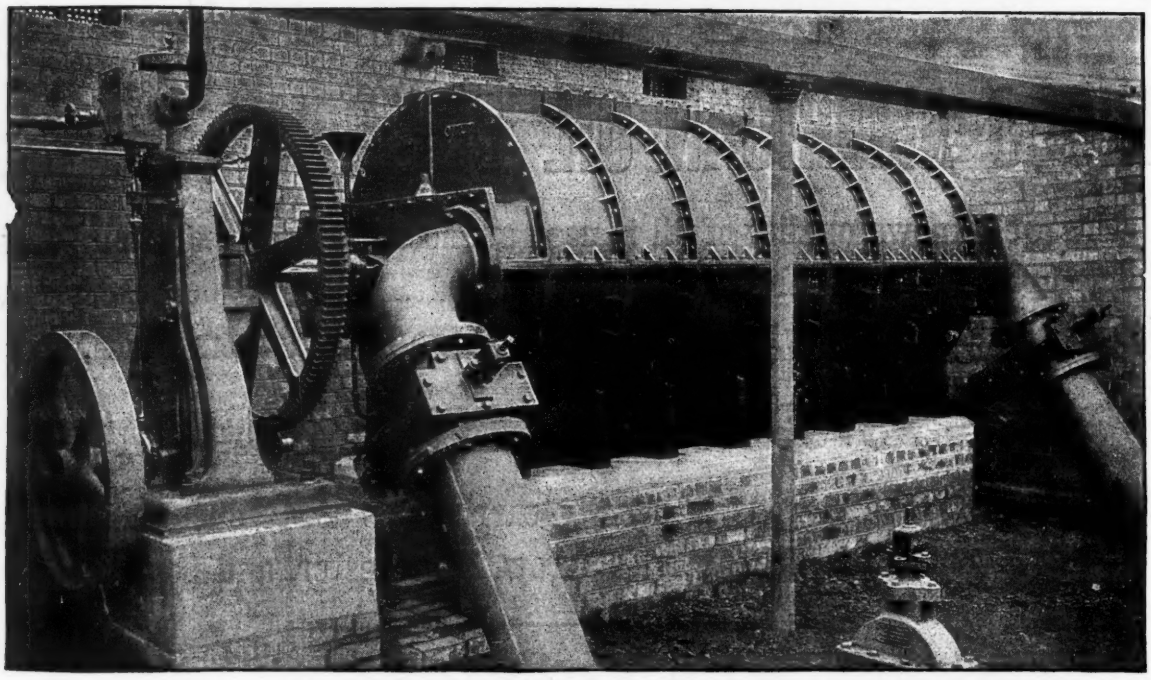
SHALLOW REGENERATORS A SPECIALITY

MANY INSTALLATIONS.
EXCELLENT RESULTS OBTAINED.

RETORTS RE-SET.
RETORT IRONWORK.
COAL AND COKE-BREAKING AND CONVEYING MACHINERY.
BUILDINGS, ROOFS, &c.

KIRKHAM, HULETT, & CHANDLER, LD.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.



PATENT "STANDARD" WASHER-SCRUBBER

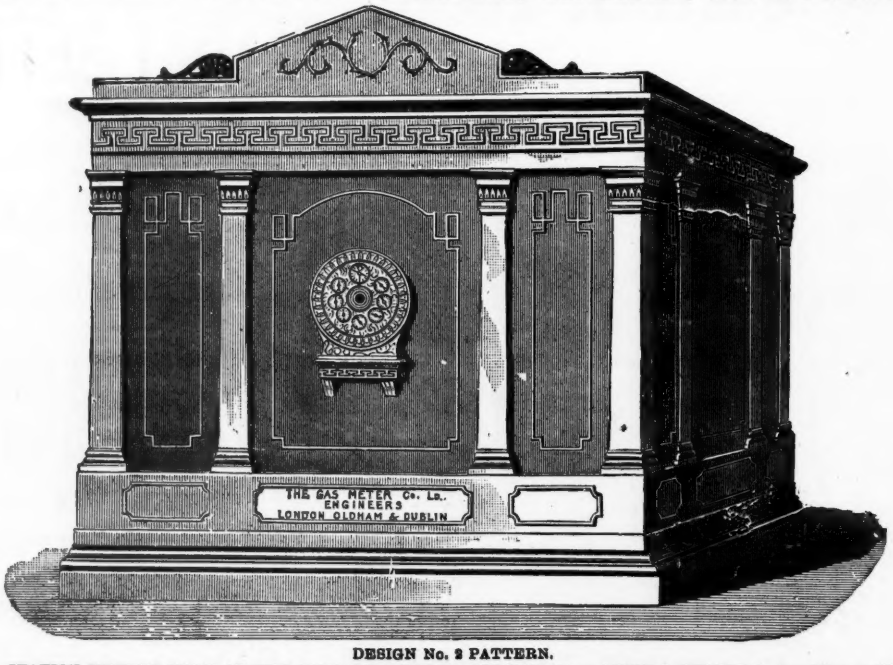
Extracts all Ammonia and a large proportion of Sulphuretted Hydrogen and Carbonic Acid.

THE GAS-METER COMPANY, LIMITED

MANUFACTURERS OF

WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.



STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (Late WEST & GREGSON). Established 1820.

Prices and Particulars apply to

R. L. ANDREWS, General Manager.

Works: 238, KINGSLAND ROAD LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

Telegraphic Address: "METER."

[See Advertisement on back of Wrapper.

ALEX. C. HUMPHREYS, M.E.
A. G. GLASGOW, M.E. } MM.Inst.C.E.

SINCE 1893

MESSRS. HUMPHREYS & GLASGOW

Have constructed or have in hand

CARBURETTED WATER-GAS PLANT

FOR THE FOLLOWING UNDERTAKINGS:—

American construction is instanced only when from the LONDON Designs of Messrs. Humphreys & Glasgow.

	Cub. Ft. Daily.		Cub. Ft. Daily.
Copenhagen	700,000	Guildford	350,000
Copenhagen (Second Contract)	2,500,000	Syracuse, N.Y.	850,000
Belfast	1,700,000	Brentford	1,200,000
Belfast (Second Contract)	4,500,000	Commercial Gas Co.	850,000
Brussels	700,000	Commercial Gas Co. (Second Contract)	850,000
Brussels (Second Contract)	700,000	Commercial Gas Co. (Third Contract)	1,250,000
Liverpool	3,500,000	Bridlington	125,000
Liverpool (Second Contract)	4,500,000	Middlesbrough	1,250,000
Tottenham	750,000	Croydon	1,250,000
Tottenham (Second Contract)	750,000	L. & N.W. Railway, Crewe	700,000
Santiago	400,000	Taunton	225,000
Swansea	750,000	Lawrence, Mass.	400,000
Manchester	3,000,000	Rotterdam	850,000
Brighton	1,750,000	Dorking	125,000
Preston	1,500,000	McKeesport, Pa.	500,000
New York	1,200,000	The Gaslight and Coke Co., Bromley	3,750,000
Southport	750,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Bath	1,000,000	Durham	200,000
Newburgh, N.Y.	350,000	New York (Remodelled)	11,000,000
Newburgh, N.Y. (Second Contract)	250,000	Scarborough	800,000
Hoylake	125,000	Perth, W.A.	125,000
Coventry	600,000	Bremen	550,000
Coventry (Second Contract)	600,000	Maidenhead	225,000
Bordentown, N.J.	125,000	Epsom	225,000
Winchester	200,000	North Middlesex	150,000
Shanghai	225,000	Wandsworth and Putney	1,800,000
Stockport	500,000	Aarhus	800,000
Norwich	1,000,000	Falmouth	150,000
Holyoke, Mass.	600,000	Southampton	800,000
St. Joseph, Mo.	750,000	Hartlepool	750,000
Lea Bridge	350,000	Utrecht	1,000,000
Lea Bridge (Second Contract)	350,000	Deventer	150,000
Stockton-on-Tees	500,000	Portsmouth	1,000,000
Edinburgh	2,000,000	Bournemouth	1,000,000

In addition to which the 1891 Installations of The Gaslight and Coke Company, on the Humphreys Double-Superheater System, have a capacity of 12,000,000 Cubic Feet per diem.

IN THE UNITED STATES, TO DEC. 31, 1898.

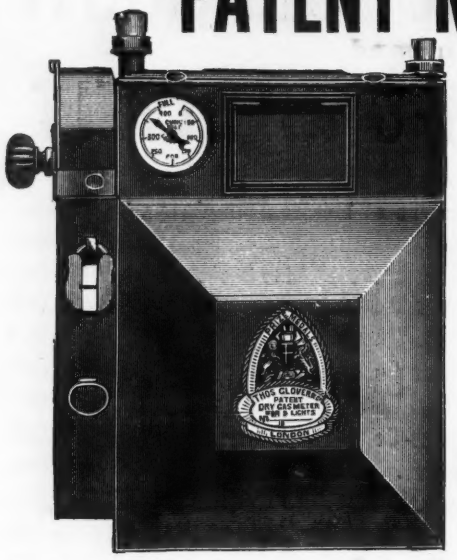
Messrs. Humphreys and Glasgow and their Colleagues The United Gas Improvement Company have jointly constructed 293 Sets of Humphreys Double-Superheater Apparatus (excluding earlier extensive construction of Single Superheater and "Combined" Apparatus) with a daily capacity of 219,550,000 cubic feet. **Of this volume, 56,875,000 cubic feet daily were undertaken during 1898.**

9, VICTORIA STREET, LONDON, S.W.
Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:
BANK OF COMMERCE BUILDING, NEW YORK.

THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

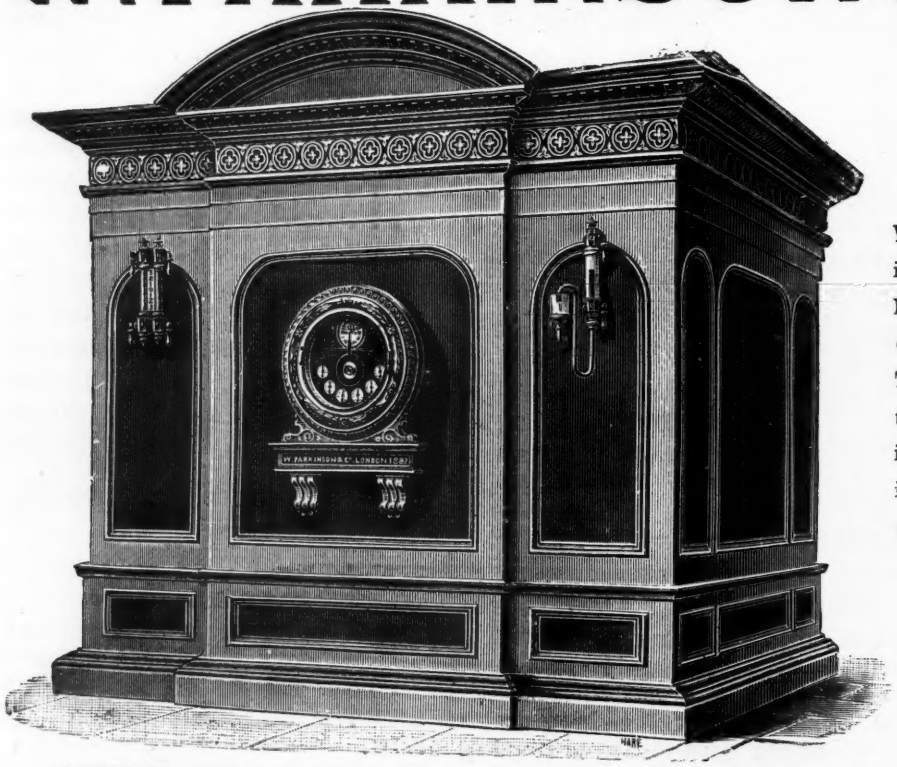
BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1029.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 3098.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address:* "GASMAIN." Telephone No. 1525 South Side.

W. PARKINSON & CO.



W. PARKINSON & CO. have introduced this design of Station Meter in order to meet the demand for a more ornamental Tank. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

COTTAGE LANE WORKS, CITY ROAD,

LONDON.

Telegrams: "INDEX." Telephone No. 778 King's Cross.

BELL BARN ROAD WORKS,

BIRMINGHAM.

Telegrams: "GASMETERS." Telephone No. 1101.

[See also Advt. on last White Page.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

Municipal Trading—An Incompatibility 849
Cases under the Workmen's Compensation Act 850
Supporting Strikes Out of the Poor-Rate 850
The Workmen's Dwellings Bill 851

WATER AND SANITARY AFFAIRS—

The Meeting of the East London Water-Works Company . . . 851
The Government Water Bill through Committee 852

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market 852
Electric Lighting Memoranda 852
Auditors 853
The Working of Ventilation Systems 854
The Chemist on Coke Making 855

NOTES:—

The Flow of Compressible Gases in Pipes 856
The Fatigue of Metals 856

COMMUNICATED ARTICLE:—

Experiences with the Incandescent Gas-Light. By Norton H. Humphrys, Assoc.M Inst.C.E., F.C.S. 857

TECHNICAL RECORD:—

Recent Developments in the Gas-Engine Field 858
The Purification of Public Water Supplies 859

CORRESPONDENCE:—

The Proposed Increased Prices of Welsbach Burners 860
Tar for Boiler Firing 860
The Jasper Incandescent Gas-Mantle 860

PARLIAMENTARY INTELLIGENCE:—

House of Lords—Progress of Bills 861
House of Commons—Progress of Bills 861
House of Commons Committee—
Metropolitan Water Companies [Government] Bill 861

LEGAL INTELLIGENCE:—

Winding Up of the Compressed Air Gas Company, Limited . . 863
Defrauding the Harrogate Gas Company 863
Is Electricity an "Article" under the Factory Act? 863

MISCELLANEOUS:—

German Continental Gas Company—Report and Accounts for 1898 863
The Birmingham Gas Undertaking and the City Rates 863
Commercial Gas Company—The Half-Yearly Report and Accounts 864
Meeting of the San Paulo Gas Company, Limited 864
Proposed Advance of Gas Workers' Wages at Leeds 865
New Works for the Cromer Gas Company 865
The Water-Gas Works for Hamburg 865
Electric Lighting Notes 865
Meeting of the East London Water-Works Company 866
Metropolitan Water Supply Commission—Sixty-Third and Sixty-Fourth Days—Close of the Inquiry 868
Notes from Scotland 870
Gas and Water Companies' Stock and Share List 870
Current Sales of Gas Products 871
Coal Trade Reports 872

PARAGRAPHS:—

PERSONAL: Mr. E. A. Cowling; Mr. R. B. Simmers; Mr. John Smith; Mr. G. Stevenson; Mr. G. F. Andrews; Mr. Henry Woodall; Mr. R. B. MacCall 856
OBITUARY: Mr. Isaac Hart; Mr. John Battersby; Mr. Thomas Stanley Cleminshaw 856
Institution of Gas Engineers—The Repayment of the Costs of Private Bills 851
The Action of Water on Zinc-Lined Vessels 852
Coal in Kent 853
The "Builder" on the Advisability of Supplying Unenriched Gas 856
The Real Value of Acetylene as an Illuminant—The International Acetylene Congress 858
The Acidity of Moorland Waters—Clevedon Gas Company . . . 860
Long Eaton Gas Company 862
The Councillors' Bond Question at Bangor—Newton-in-Mackerfield Gas-Works 863
Public Lighting by Acetylene in Prussia 870
Incandescent Gas Lighting at Altona—Projected Extension of the Leek Gas-Works—Sales of Shares 872
Dewsbury Water-Works Profits—Formby Gas Company—The Charge against a Sheffield Accountant—The Progress of the Llandudno Gas Undertaking—Claim for Damages for Electrolysis—Bude Water Supply—Warrington Corporation Bill—The Bristol Electric Lighting Committee's Views on the Bristol Gas Bill 873
A Drunkard Poisoned by Gas at Belfast—Exmouth Gas Company
Gas Explosion in Piccadilly—Consolidated Water-Works Company of Rosario, Limited—The Opposition to the Yeadon and Guiseley Gas Bill 874

TO ADVERTISERS.

UNDISPLAYED ADVERTISEMENTS—Situations Vacant and Wanted Apparatus Wanted and for Sale, Contracts, Public Notices, &c.:—

Six Lines and Under (about 42 words) . . . . . 3s. 0d.
Each Additional Line 0 6

Quotations for Trade Advertisements, Prospectuses of Public Companies, &c., on application to the Publisher.

All communications, remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Post-Office Orders should be made payable at the Chief Office, St. Martin's-le-Grand; Cheques crossed "Union Bank of London."

Telegraphic Address: "GASKING LONDON."

Telephone Number: Holborn 131.

EDITORIAL NOTES.

Municipal Trading—An Incompatibility.

THE Association of Municipal Corporations have met once more, and re-elected Sir Albert Rollit to the presidency of the organization, which "The Times" somewhat contemptuously classifies as "a harmless, if not conspicuously "useful, body." The meeting offered a fitting opportunity for the delivery of a sensible declaration of policy respecting the vexed question of Municipal Trading; but, unfortunately, the occasion was not taken. Consequently, the reputation of the Association suffers the depreciation that is always the penalty of avoidance of a difficulty. Sir J. T. Woodhouse, the Vice-President, occupied the chair; and all he ventured to say on the one subject that must have possessed actual interest for the assembled delegates, was half-a-dozen words of but trifling import. He thought "it must be a matter of great satisfaction to the "Municipalities" that the House of Commons had rejected the General Power Distributing Bill. Also, "they would "have to be a good deal on their guard with regard to the "Committee on Municipal Trading." Tremendous observation! The Chairman was good enough to allow that "there should probably be limits to municipal enterprise," but concluded with the generality that "it behoved them "to take care that they were not entrapped into prevent-"ing Municipalities from progressing, as in the past, in "reference to matters of a public character." This is only hopeless, aimless chatter. The Association addressed by the speaker may not be of very much use in the world, as "The Times" remarks; but it undoubtedly embraces a small knot of municipal magnates who warmly favour the idea of enormously enlarging the activities of Municipalities in industry, and see nothing amiss in doing all they can to oust or worry the private trader.

As the writer in "The Times" very fairly puts it, a source of error in regard to this matter is the fact that "up to a certain point a good case in regard to almost "every branch of industry can be made out for municipal "trading." This is quite true; and when a raw local politician stumbles, by the aid of the halfpenny newspaper, upon the amazing discovery, straightway he dubs himself a "Progressive," and howls "Reactionary!" at the man who knew it long ago, but is not forgetful of other considerations. There is no hard-and-fast line to be drawn round the principle. The question of expediency, on the merits, must be determined for every case. The problem, of which Parliament has taken cognizance, demands for its solution good sense and a knowledge of human nature. Unhappily, these are not Progressive virtues. Why does not Glasgow add to its vast municipal system an opera house, a distillery, a lottery, and a department for the distribution of "soor mulk"? These are questions which cannot be disposed of by abstract reasoning. The consideration now to be faced by Parliament is that Municipalities are going more and more deeply into trade, without troubling to prove expediency on any but the very narrowest basis. It is asserted, without sufficient regard for the facts, that the municipalization of gas and water works is everywhere a public advantage and a practical success. In some instances, the process has been beneficial to certain interests; but this is far from justifying an unbounded extension of the operation. There is much to be said for the doctrine that trading by Municipalities is at best a necessary evil, inasmuch as it would never be thought of if private interest were always a complete equivalent for public spirit. It does not follow, however, that public spirit is always competent to take the place of private interest as the motive power of industry and enterprise in trade. Here is the weak point of the argument for Municipalism. It is pointed out by "The "Times" that a complete inquiry into the subject may be expected to establish a curious similarity between the dangers of municipal trading and those of Protection. But inquiry is not required to discover this resemblance, inasmuch as it is an admitted principle of Progressive Municipalism that every Corporation enterprise shall be a statutory monopoly. If this is not Protection, one would like to know what else to call it.

There is one other consideration pertinent to this inquiry, which we have not seen recognized, much less discussed. It is that the Local Authorities of the United Kingdom must choose one of two lines of development—

the trading or the administrative. On the one hand lies the prospect of an extensive devolution of the powers now exercised by Parliament upon the largest county and borough Corporations. On the other stands the municipal factory and shop. Which will the Authorities choose? They cannot have both. How little the general public understands the irreconcilability of the two functions, trading and administrative, has been shown by a pettish complaint of a leading newspaper that precious parliamentary time had been occupied with a long debate upon a Welsh Water Bill. It was asked why this sort of thing could not be left solely to the London County Council—the inquirer being evidently ignorant of the fact that it was this very body who were promoting the Bill as a means of attacking private interests. Devolution would plainly be impossible in such a case, which does not stand alone.

Cases Under the Workmen's Compensation Act.

THE Appeal Court has been busy again with knotty points under the Workmen's Compensation Act. It has been settled, for one thing, that the height of a building, for the purposes of the Act, must be the whole height of the structure above the ground to the ridge of the roof, and not only to the parapet as under the London Building Act. An addition of an iron girder to a building already constructed, solely for the purpose of checking vibration, is not either "construction" or "repairs," within the meaning of the Act. A temporary scaffolding 8 feet high, of trestles and planks, used for setting up this girder, was not a scaffolding required for the construction or repair of the building; and accordingly a man who fell off such a temporary erection and was killed was not protected by the Act. The word "alteration," applying to a building, does not appear in the Act. All their Lordships agreed in holding that, in its application to a building 30 feet high and upwards, the Act must be interpreted as relating to the building as a whole, not to every little thing that might be done to any part of it, such as whitewashing a ceiling—or even, as in the case in point, inserting a supplemental girder in the walls about 8 feet from the ground.

An example of a class of accident that must be tolerably common was furnished by the case of *Rees v. Thomas*. Here the workman was killed while trying to stop a runaway horse belonging to his employers, which was not part of his ordinary duty—indeed, he had no business to be where he was when the horse bolted. According to the familiar wording of the Act, a workman, to be entitled to compensation, must be engaged in his proper work, and must not have contributed to the accident by being guilty of serious and wilful misconduct. The questions in this case were therefore two—first, as to whether a man who is breaking a rule is constructively guilty of serious and wilful misconduct, if trouble comes of it; and, secondly, whether an accident of this kind can be said to arise out of the employment. Very fortunately, the Court held that the breaking of a rule will not bear the construction suggested. The question of what constitutes serious and wilful misconduct is a pure question of fact, not of legal inference. Also, when a man does upon an emergency something quite outside the scope of his ordinary employment, in the interests of his employer, he is held to be protected by the Act. Any other interpretation would have been disastrous. As it is, workpeople do not often go very far out of their way to attempt to save anything from going wrong; and if by so doing a man were to forfeit his right to compensation, industrial life would be bound in the hardest selfishness.

A highly important decision was that in *Wood v. Walsh and Son*—a case from Leeds, which turned upon the question whether painters working on the outside of a house in the usual way are protected by the Act. The man was standing upon the rung of a ladder, when it broke. Several points consequently arose as to the application of section 7, sub-section 1, of the Act. The Court held that the section does not apply to the painting of the outside of a house, which is not repairing it. If the Legislature had meant to include painting with repairs, and ladders with scaffolding, they would have said so. The Court declined to attempt to define what is or is not a scaffolding, though it is to be expected that they will have to deal with many appeals in which the question will be raised. It is idle to make capital out of these difficulties of interpreting the Act. As Lord Justice A. L. Smith said, the argument is frequently pressed upon the Court that if a particular case is decided in a certain way a large number of persons will be excluded from the Act. That is not the point. It is quite clear, upon the face of it, that the Act is not meant to apply to all workmen. Some are left outside; and it is often the duty of the Courts to draw the line.

We learn that the first fatal accident to a workman in the employment of The Gaslight and Coke Company since the Act came into force happened at Beckton recently. A man named J. Callaby, whose work was the loading of coke-trucks, was crushed between two of the waggons of a moving train. It appears that the man rashly attempted to cross the line between the trucks, and paid for his temerity with his life. If this was the way of it, the incident only shows once more the foolhardiness that comes of familiarity with moving machinery and rolling stock. We are not at present in possession of complete information as to what has been done in this case.

Supporting Strikes Out of the Poor-Rate.

AN important question of law has been disposed of by Lord Justice Romer, who before his elevation to the Court of Appeal had to decide the point as to whether the Poor-Law Guardians have the right to afford relief to men on strike, and to their families. The action arose out of the South Wales coal strike; the ratepayers of the Merthyr Tydvil Union alleging that the Guardians had exceeded their powers in opening relief works at the public charge for the purpose of succouring the colliers who might have had work on the masters' terms. It is obviously an important question; for if a workman on strike can go upon the rates for maintenance, he has at command a strike fund to which his employers are bound to contribute. Poor relief, however, is a strictly personal affair. In theory, every case of application for assistance out of the rate has to be dealt with on the merits. Practically, the matter might be affected by what chemists call "mass action." The Guardians of a particular Union might even be elected with a view to eventualities; and it is conceivable that such a body might take a very peculiar line in dealing with the emergency of a general strike. In the case in point, the Merthyr Tydvil Guardians undertook the responsibility of systematically relieving strikers; and some of the principal ratepayers of the Union, headed by a Colliery Company whose men were on strike, moved the Court of Chancery to restrain this proceeding by injunction. Lord Justice Romer has now decided that he ought not to interfere with the discretion of the Guardians in the matter. His Lordship's judgment naturally rests upon the legal aspects of the particular case. He first decided that a man who will not work, though there is work for him to do, and he is able to do it, has no right to parish relief. But there are considerations suggesting exceptions to this general rule. Urgent cases of destitution necessitate immediate, if temporary, relief. But what if the refusal to work persists? Then, says his Lordship, the Guardians ought to proceed against the man under the Vagrancy Act. At any rate, so the judgment runs. Boards of Guardians exercising their discretion are not to be interfered with by injunction, unless the very clearest case of robbery of the public is made out. Actual starvation is hard to argue with, when it once declares itself.

All the same, those who are responsible for the administration of the Poor Law owe it to the ratepayers to take every precaution against the occurrence of such an emergency. It is no new thing for strike agitators to call upon their victims to rely upon their numbers for hindering the application of the law; and in other places besides South Wales the possibility of obtaining support for a strike out of the poor rate has been mooted. The Merthyr Tydvil Guardians need not have been caught napping. As a matter of fact, they were not. They knew what they were about, and chose to shut their eyes to everything but a too certain destitution. Practically, all who asked for parish relief obtained it; and the effect was the same as if the Guardians had passed a resolution devoting so many thousands of pounds in aid of the strike. Now the day of reckoning has come, but not in the Law Courts. The Local Government Board Auditor has disallowed the exceptional payments, and surcharged the Guardians with the expenditure, amounting to nearly £20,000. There is a right of appeal to the Board, who have a wide range of dispensing power. It is eminently desirable that the rights of the matter should be thoroughly established, for the guidance of Guardians of the Poor everywhere. There are many parts of the country where the working people

and the small shopkeepers constitute the majority of all the elective Local Authorities, while the land and the employment are in the hands of a few individuals. Democratic institutions in such circumstances are exposed to great temptation to one-sided action, which makes it imperative upon the Central Authority to keep the members up to a due sense of their official obligations.

The Workmen's Dwellings Bill.

A VERY interesting and important class of considerations is touched by the Workmen's Dwellings Bill of the Government. So quietly has this measure been introduced, and so careful have its sponsors been to restrict its scope, that some of their political opponents are venturing to jeer at the Bill as almost stillborn. It is condemned because it has not aroused any "enthusiasm" in the House of Commons. But it should have occurred to these too-ready critics that possibly legislation without trumpet flourishes and bangings of the big drum of Party may be the more excellent way. Precisely how much Socialism or Municipalism there may be in the Government proposal we are not curious to inquire; preferring to regard the Bill as a modest attempt to widen the financial horizon of the town workman. This has hitherto been narrow. If a working man had any money to "put away," there were the Friendly Society, the Post Office Savings Bank, the Building Society, and perhaps a small local club or two, at his service. The Building Society has fallen upon evil days. Besides, it borrows and lends; and the business transacted has little relation, if any, to the circumstances of the individual member. The Government Bill proposes to encourage the working man to acquire a "stake in the country" which he can realize at first hand, by facilitating his becoming the owner of the house he lives in. It will open to the small investor "a source of loan which will not entail "any intermediary profits; but will only add the bare costs "of administration to the lowest rate of interest." One needs to have regard to the conditions of working-class housing in the manufacturing towns in order to appreciate the probable effect of this new aid to thrift. People are apt to talk about the "nomadic habits" of working people; but this is a characteristic of only a small proportion of the industrial population. By far the larger number of the hand-labouring class stay long in the same place. There are whole wards of manufacturing towns occupied by a stable population of artisan householders, who in the course of their working lives pay in rent the value of their dwellings several times over, and after all are at the mercy of the landlord or the town "improver"—to say nothing of the railway company—who may turn them out at short notice. These householders are voters, yet most of them pay their rates indirectly through their rent. Consequently, they do not feel the bearing of local politics; while the compounding landlord appreciates it only too well. These worthy, respectable cottage occupiers are rentpayers by compulsion only. The Building Society cannot help them to acquire the dwellings they really prefer; but it can, and does, spoil the suburbs with new buildings which are not always wanted. When the workman is able to become the owner of his house, he will pay all the rates and taxes himself; and will be likely to take a more direct interest in the economical management of local affairs. If he fancies a prepayment gas-meter and fittings, he will have to ask nobody's permission to have the convenience. Altogether, the Small Dwellings Acquisition Act may well turn out a more important piece of legislation than many of the schemes that bulk so largely in political programmes and concern the individual citizen so little. Anything that touches the householder so closely "where he lives" must be deserving of particular consideration.

Institution of Gas Engineers.—As already announced in these columns, the annual meeting of this Institution will be continued on the 2nd and 3rd prox., at the Institution of Civil Engineers. We understand that papers have been promised by Mr. C. F. Botley, Mr. C. C. Carpenter, Mr. T. Holgate, Mr. J. O. V. Irminger, Professor Vivian B. Lewes, and Mr. G. P. Lewis. The third day will, as usual, be devoted to an excursion.

The Repayment of the Costs of Private Bills.—In the course of some proceedings on an unopposed Bill a few days ago, the Chairman of Ways and Means (the Right Hon. J. W. Lowther) announced, with regard to the period for the repayment of moneys borrowed for the costs of Private Bills, that he had agreed this year to grant a period of ten years; but next year he would reduce it to five years.

WATER AND SANITARY AFFAIRS.

THE speech delivered by Colonel Lockwood, M.P., in presiding over the half-yearly meeting of the East London Water Company, presents a masterly vindication of the course adopted by the Directors, and an equally distinct condemnation of the policy pursued by the County Council relative to the water question. It is difficult to conceive how anyone possessed of an independent judgment can become acquainted with the calm and logical array of facts thus brought forward, without being convinced that the Metropolitan Water Companies have been treated with eminent injustice, and that the County Council occupy a position on the London Water Question which is seriously prejudicial to the interests of the consumers and the ratepayers. The facts of the case really warrant the very grave indictment that the Council have endeavoured to ruin the water supply of London. Confessedly the Council sought to place the East London Company in default with regard to the supply of water, so that the undertaking might be purchased at a reduced value. How nearly the Council succeeded, and how hard their victims were pressed, will be seen by the Chairman's speech. That which was attempted in the case of one Company would doubtless apply to all under like circumstances. It has been alleged—we can hardly say it has been argued—that the East London Company fell into difficulties with regard to their supply of water, owing to a want of foresight on the part of the Directors. Yet in 1890 the Company were surveying lands and preparing plans for the enlargement of their reservoirs; whereas in 1893, at the instigation of the County Council, the entire work was thrown back by the rejection of the Company's Bill in Parliament. In 1894 a Bill almost identical in terms with that of the year before passed its second reading by the bare majority of only one; the opposition of the County Council being as inveterate as in 1893. The ground on which the Council opposed these Bills was that the proposed works were unnecessary, and that the Company were only seeking to expend capital in order to increase the value of their undertaking. Parliament, however, though favouring the Bill of 1894 by the minimum majority of one, had to accept the decision of a Select Committee that the contemplated works should be pushed forward with all possible despatch. But the rejection of the Bill of 1893 was not fully atoned for by passing the Bill of the year following. The want of increased storage led to the intermittent supply of 1895 and 1896. It has been said that the East London Company are always breaking down, and thus they afflict the district with an "annual water famine." It is safe to say that no interruption of the supply would have occurred in 1895 and 1896 had Parliament seen the necessity of the works proposed by the Company in 1893, which necessity it failed to see owing to the perverse pleading of members belonging to the County Council.

With respect to the recent drought, it cannot be denied that the event was one beyond the prescience of the wisest. All the East London work authorized by Parliament in 1894 was completed by the summer of 1897; and in the latter year the Company obtained power to provide still further storage. But all calculations were set at defiance by the failure of the River Lea consequent on a rainfall which for the year ending last September was only half the usual amount. Under these circumstances, what did the County Council do? How far did that astute body anticipate the critical event? The East London Company had done their best by taking into their mains all the water the New River Company could spare them. They had no further resource until the Southwark and Vauxhall Company succeeded in passing a Bill which was then in Parliament. Did the County Council see the importance of getting this Bill passed as promptly as practicable? On the contrary, they gave it their strenuous opposition; seeking, if possible, to cut off the last hope of aiding the East London district. Such was the foresight of the Progressives—striving not to aid the East London supply, but to starve it. The Directors, in endeavouring to protect the district from a failure in the service, had to fight their way at every step against the County Council. That the Directors were not merely seeking to swell their capital account was shown by their earnest and costly endeavours to mitigate the inconvenience occasioned by a restriction of the constant supply; these expensive and extra measures laying a heavy burden

upon the undertaking. The complaint that the Company charged for water they did not supply is met by the fact that the extraordinary means they employed during the severe drought were far more costly than the ordinary operations of the constant service—the increase in the maintenance account during the second half of the year being not much less than £36,000; creating a total of more than £91,000 in place of something exceeding £55,000. Any idea that the shortened supply benefited the Company is thus altogether a mistake. The anxiety and the labour which devolved on Mr. George Banbury, as the Chairman of the Company, in connection with the drought and the constantly recurring parliamentary troubles, may very reasonably account for that gentleman's retirement from the chair as soon as the constant supply was resumed in December last.

It may well be asked: Who helped the Company in the unexampled difficulties by which they were beset, or encouraged them to meet the emergency in which they found themselves placed in the summer and autumn of last year? While the Directors and their officials were straining every nerve to alleviate the discomfort and hardships occasioned by the resumption of the intermittent service, they were bitterly attacked by the local Members of Parliament, and their best efforts misrepresented. To inveigh against the Water Company was supposed to be the high road to popularity; and that road was persistently trod. What help did the Press render? With the noble exception of "The Times" and one or two other journals, there was one long howl against the Metropolitan Water Companies in general and the East London Company in particular. After the delivery of the Chairman's address at the meeting of the Company last week, Mr. F. Tendron spoke very decidedly concerning the part played by a portion of the London Press. He considered it monstrous that men in the high position of editors of the papers in question should mislead the public in the way they had done, "setting an example of "personal vilification of officers of the Company that would "be disgraceful in the lowest American yellow rag." If we may judge by the editorial remarks in the "Daily News" of Friday, there is little prospect of improvement in the tone of the London Press. Colonel Lockwood's unanswerable array of facts is treated as "an apology;" and the East London Company are said to afford "an invaluable example of the "way in which public business ought not to be done." So we may say the "Daily News" affords an example—invaluable or otherwise—of how a paper "ought not" to be edited. There is no attempt to meet the statements put forth by Colonel Lockwood, but everything is covered by the one asseveration that London will never have a proper water supply until the Companies are superseded by the London County Council.

The Metropolitan Water Bill introduced by the Government was promptly dealt with at the commencement of the past week by the Hybrid Committee of the House of Commons appointed to consider it. Mr. Fitzgerald, on behalf of the Local Government Board, declined to call evidence, and relied on the interim report of the Royal Commission, to which the Bill was designed to give effect. This denied the London County Council the pleasure of cross-examining witnesses. But the Council produced a witness of their own in the person of Mr. Dickinson, the Chairman of the Water Committee, whose statement disclosed a policy of an outrageously narrow-minded and obstructive character. The purpose embodied in the Bill was to enable and require the Companies to supply each other with water in cases of emergency. But the Council feared that this would so improve the position of the Companies as to interfere with a scheme of purchase, and in other ways run athwart the line of the Progressive plans. Accordingly it was asked that the Bill should contain a clause to render it only a temporary measure. Moreover, the Council considered—after their manner on other occasions—that the Bill was "not necessary." But the Hybrid Committee, with Mr. Chaplin in the chair, differed from them; and the Bill was ordered to be reported with only some immaterial amendments. Still the Council repents not.

The Action of Water on Zinc-Lined Vessels.—In a paper recently read before the Society of Chemical Industry, Mr. H. E. Davies points out that, under suitable conditions, water contained in a zinc-lined vessel dissolves the metal to an appreciable extent. Further, if the water contains nitrates, these are reduced, with the formation of ammonia.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 870.)

Last week—or such portion of it as was open for business—was almost part and parcel of its predecessor from a Stock Exchange point of view. The volume of fresh business steadily diminished as the closing for Easter approached; and as soon as the settlement was completed, the attendance became very slack. But in spite of this, the tendency was very firm; and there was no sign of anything like drooping for lack of support. The outlook ahead is good; and, if nothing of a sinister character should show itself on the political horizon, the markets should have a healthy reopening. In the Money Market, there was a very strong demand right through until the close of the settlement, when, requirements being satisfied, there was a sharp change in favour of easy money. Business in the Gas Market continued brisk and animated, if it was not quite up to the level of the preceding week in point of volume. But the tone was distinctly better; and even though there have been few changes in price, they are in the upward direction. In Gaslights, the ordinary stock was conspicuous. It at once showed a disposition to recover from the depression it had encountered in the previous week. Opening at 114, it steadily advanced until 117½ was marked at the close. Of the secured issues, the preference several times changed hands at top figures; but the quotation was left standing. South Metropolitan was not very active; but it was a shade firmer than it had been. Nothing at all was done in Commercials. The accounts for the last half of 1898, now to hand, show that the Company have been doing well, and have more than earned the dividend which will be recommended at the meeting next Thursday. The Suburban and Provincial group were very quiet. Brightons show out just a little higher on *ex div.* quotations. Hardly any business was done in the Continental Companies, which closed unchanged. And the same may be said of the remoter undertakings, none of which made any sign. Business in the Water Companies was extremely limited; and the only feature was a disposition towards cheaper prices for some debenture stocks.

The daily operations were: Business in Gas was not very active on the opening day, being almost wholly restricted to Gaslight issues. But the tendency was good; and the ordinary stock rose ¼. Tuesday's transactions were more brisk and animated, and again there was scarcely anything touched but Gaslights. The ordinary showed great strength, and rose 1½. In Water, East London 4½ per cent. debenture advanced 1. Wednesday was a quieter day; but the firmness remained unimpaired. In Water, Southwark debenture fell 1. Thursday's business was fairly active; and the best prices of the week were realized. Brightons rose *ex div.* In Water, a few similar changes were made in some of the debenture issues.

ELECTRIC LIGHTING MEMORANDA.

A Board of Trade Inquiry into the Electricity Supply of the City of London—Competition Defined—How Limited Competition Works—The City of London Applications.

Last week Sir Courtenay Boyle began at the Guildhall a public inquiry in the matter of the applications of three established Metropolitan Electric Lighting Companies for Provisional Orders authorizing them to supply electricity for all public and private purposes within the City of London. The proceedings promised to be of an interesting character, as they were distinctly novel. Generally, the Board of Trade were asked to regard the petitions as coming within the scope of the Electric Lighting Act, 1882, which encourages competition in electricity supply. The area specially in question—the City of London—is actually in the effective occupation of the City of London Electric Lighting Company, who are there by virtue of a Provisional Order and also of a contract with the City Corporation. All the applicants offered particular reasons why they should respectively be admitted into the coveted region; while the Company in possession did not want any of them. Of course, if the City of London Company had been the City Corporation, instead of merely a contractor under this Local Authority, Municipalism would have been stirred to its depths to defend the sacred soil from invasion; but as it was only a Company whose "monopoly" was threatened, the issue was left open. During two days Sir Courtenay Boyle sat to hear the cases of the would-be competitors. Some notable admissions were made by different witnesses. Mr. T. H. Brooke Hitching, a member of the Corporation, who has advocated the purchase of the existing City Company's undertaking in the interest of the ratepayers, wished to bring the question into the present inquiry; but he was baffled. In return, he was bluntly asked by Sir C. Boyle what was his opinion with regard to the desirability of competition. And before answering, this witness gave a cursory definition of "so-called competition" as meaning "the entry into the City of another company with a view to exploiting the pockets of the ratepayers and drawing profit therefrom."

The definition is luminous—not exactly in the sense intended by the author; but as indicating the primitive character of the

view of public supply enterprises that possesses the municipal mind, as exhibited by Mr. Brooke Hitching. His words seem to imply that he regards the money taken by public providers in payment for their wares or services as so much plunder of the purchasers. It is the same way of looking at business that commended itself to the genial outlaw, Robin Hood. The exploitation of the pockets of the City of London ratepayers by a competing electric lighting company could only take effect through the victims entertaining the delusion that they were getting their money's worth at the new shop. But Mr. Brooke Hitching does not leave the matter here. He thinks that the existing City of London Company do not deserve much consideration, because they have not been sufficiently "progressive"—blessed word, symbolizing all the virtues!—but he doubts whether, if a competing Order were granted, the result would be real competition. If there were, only the consumers of electricity would benefit thereby; the citizens generally would not get any compensation for having the streets torn up and the ways made foul again for the laying of another distributing network.

We agree with Mr. Hitching that the question of the reality of competition in electric lighting areas where competitive conditions prevail is at the bottom of the business which Sir Courtenay Boyle has to dispose of. This being so, he made a mistake in taking up the time of the inquirer with generalities and guesses. There is competition, nominally at least, in several other Metropolitan districts; and it would be easy to obtain positive testimony as to how it works—that is to say, if anybody really wants to be told. Sir Courtenay Boyle is not in this case; nor are the City of London Company. They know quite well that where a district is served by two undertakings whereof one is in better circumstances than the other, it is the cheaper service that rules the price for both. Hence, if A company can sell electricity at a reasonable profit for 4d. per unit, B company will have to charge the same price, although they may not be able to make it pay. This consideration therefore answers Mr. Hitching's query. There will be competition of the A with the B company; but not of the B with the A concern. From the moment of the appearance of the cheaper supply upon the scene, this sets the value of the commodity. This is all very well, so far as it goes; but a one-handed competition such as this is not real competition. It is at best a tacit agreement upon the selling price. The undertaking with the best conditions need not consider the other one at all; so that the public are still bound to one set of conditions. Unlimited competition in electric lighting is, of course, out of the question. It is impossible to let one set of undertakers after another into a district because they happen to be able to offer a supply at a trifle under the existing price. The economic balance is sure to be struck, sooner or later; and then it will not matter one iota to the consumer whether the supply is in the hands of one undertaker or of many.

In advising the Board of Trade upon these proposals, Sir C. Boyle will have regard to the future as well as to the present. Supposing the most favourably circumstanced new comers are able to offer a supply at, say, 30 per cent. less than the actual ruling price, is the reduced price likely to remain the standard for the future? On the face of it, and speaking without pretending to have made an exhaustive comparison of the circumstances of the rival companies, we incline to believe that this would be the probability. Say that the existing price of electricity within the City is 6d. per unit, and another company offer to supply at 4d., the latter price, if the offer is accepted, would probably prevail in the City for as long as it is necessary to reckon for. And not only so—to sanction the occupation of the City on such terms, by a company doing business outside also, would most effectually bar the company from all thought of reducing the price in any part of their area for the remainder of their existence under the Acts. The City is not a good place to light, as the old Company have already discovered. If any outsiders try it, they will find out the same truth. Only, the price of the discovery will be paid, in their case, not by the City consumers, but, in part at least, by the outside customers. There are other considerations that might be adduced as pertinent to the issue; but enough has been advanced to show that Sir C. Boyle has a knotty matter before him. There is not much reason to fear that he will fail to grasp the business in the right way. He knows what the Electric Lighting Acts mean, if others do not. He is not likely to forget that one principal object of the law is to prevent districts from being held in bondage by supply undertakings which are unable to do justice to their statutory facilities. On the other hand, the Department are not to be suspected of love of competition merely for the name of it, or of favouring anything of the kind when it is fraught with the potentiality of diverting the benefits of commercial development into the wrong hands.

Coal in Kent.—The coal boring which the Kent Coal Exploration Company have been carrying on at Barham, midway between Canterbury and Dover, for several months past, successfully struck the coal measures on the 24th ult.; the result being officially confirmed two days later by Professor Boyd-Dawkins, the geological adviser to the Board. The boring is about nine miles inland from the point at Dover where the coal seams were discovered by Mr. Francis Brady, C.E., and where the pits are now being sunk. The coal was entered at almost the same depth as at Dover. The boring is being continued.

AUDITORS.

THE doubts felt, and from time to time expressed, by the commercial world as to the value of the theoretical safeguard which shareholders possess, in the certificate of their auditors, against the possible dishonesty of their managers and staff, have been greatly strengthened, and the confidence placed in that certificate, by that most credulous and innocent-minded person—the average shareholder—has been rudely shaken, by the disclosures recently made public as to the state of the affairs of the Millwall Dock Company. Following, as they have, upon a series of statements made by auditors in the witness-box, during enquiries into insolvent and fraudulent companies, as to the view commonly held by them in regard to the duties of their position and the meaning of their certificates, and revealing the possibility, under the present usual system of company auditing, of irregularities of startling magnitude going undetected for an extended period of years, these disclosures have naturally been the subject of anxious consideration by shareholders, and of more or less uninstructed comment in the Daily Press. Misgivings have, moreover, or should have, been felt by the highly respectable and eminently worthy gentlemen who draw the auditing fees of the great joint-stock trading companies of London, as to whether they could swear, on the authority of their examination, that no such irregularities have been committed, or are possible, in the companies whose accounts they light-heartedly certify as correct. Our view of what constitutes the duty of an auditor—the purpose for which he is paid by his fellow-shareholders—is that he is appointed to determine to the best of his ability, and to report faithfully to the shareholders to whom he is responsible, whether or not the accounts of their business are kept honestly and accurately, and whether the balance-sheet does truly represent the profits and the position of their enterprise. To take any lower view is impossible, unless one is prepared to admit that shareholders appoint auditors merely with the object of finding them gentle and lucrative employment, rather than for the protection of the interests of the body of shareholders at large.

With the foregoing standard in mind, we propose to examine the scope, method, and value of the system of auditing usually adopted and deemed sufficient by the auditors of joint-stock companies, with special reference to gas undertakings of considerable size, and to consider whether any improvement in the system could be made, or any different plan adopted, whereby the certificate of the auditors might be rendered of greater value. We would, however, preface the examination with the remark that, in whatever criticism we make, we do not in the remotest degree impugn the honour or good intention of any auditors of any gas companies. They are, fortunately, above suspicion. It is the system which, in all good faith, has been adopted against which our criticisms will be directed.

The usual method of auditing the books and accounts of considerable gas undertakings and, *mutatis mutandis*, of all similar commercial concerns, seldom, we believe, varies materially in principle, from the following procedure. The audit generally commences with an examination of the cash book. This examination consists in comparing the entries therein with subsidiary books for the incomings, with receipts for all outgoings except dividends and wages, and with bank passbooks for the balance. As to the accuracy of the returns of cash received (either for ready-money or on credit transactions) and as to the genuine nature and correctness of the payments set out as made, the certificate of the staff of the company is usually accepted.

This, with regard to the incomings, means that no method is, under such a system, adopted of testing whether the quantities of coke and other residuals, which have been sold for cash, have been accounted for at the market prices of the day. If, therefore, the works staff agreed among themselves to sell coke at 1s. per cwt., and account for it at 10d., the shareholders would, so far as being protected by their auditors is concerned, be robbed with immunity. Again, it means that, if the cash received from the consumers of gas, or the credit purchasers of residuals, were not properly accounted for, and the amount owing by them were improperly set out in the books and overstated in the balance-sheet—whether for the purpose of misappropriation of cash, or of a false return of revenue—the auditors would, through not systematically testing the accuracy of the books in question, entirely fail to discover such irregularity. We may here ask a very pertinent question: Of the several cases of defalcations by servants of gas companies which have been reported in the newspapers, how many were discovered by the auditors?

Such an overstatement of accounts owing by consumers as we have instanced as possible, would be a fraud of the same nature as the falsifications alleged to have been discovered in the accounts of the Millwall Dock Company. The following extract from the sworn information of Mr. W. Peate, one of the Auditors of the Company, will at once make this clear, and at the same time corroborate our estimate of the commonly-adopted method of audit. (The italics are our own.)

I have made a preliminary examination of the books of the Company, and have discovered that the balance-sheets issued and circulated among the shareholders between June 30, 1891, and June 30, 1898, have been falsified in the most material particulars, in that there has constantly appeared on the asset-side of them an item described as "import and export rates due to the Company" carried out at amounts varying between £147,000 and

£232,000, which, as to a large part of such amounts at the date so entered, had no existence in fact. The preparation for audit of the said balance-sheets was controlled absolutely by the said G. R. Birt; and *I, as one of the Auditors of the said Company, was dependent for the accuracy of the above items upon the certificate of G. R. Birt and the Indoor Superintendent, Chief Clerk, and Ledger Clerk at the docks of the Company.* If the figures shown as the real amount of the asset had been truly certified to me, the profits appearing in the said accounts as available for dividend would have been substantially less, and the profit taken by G. R. Birt during the time of his managing directorship under his commission of 2 per cent. would have been proportionately less. By means of the publication of the balance-sheets above specifically referred to, the Directors and shareholders of the said Company have been deceived as to the true financial position of the Company; and during the period over which they range, the profits of the Company have been fraudulently over-estimated by some thousands of pounds in each year.

In respect of the outgoings, similar possibilities of fraud are not guarded against by such an audit as we are considering. No care is taken, as a rule, we fear, to test whether the receipts presented for audit represent genuine authorized payments—that is to say, whether the sums reported to have been paid have been actually debited to the accounts of the vendors, and are to meet corresponding credits for coal or other goods purchased; or, if so properly accounted for, whether these goods have been (or should have been) received and have been paid for at the fair market rates. How many auditors ever examine the accounts for coals purchased with the contracts entered into by the directors? Few, if any, we believe. So, if the staff of a gas company conspired to pay a coal merchant, for valuable consideration, a higher price for his coal than that at which the directors agreed to purchase, the shareholders would be without protection by their auditors. The same question, the same answer, and the same possibility, apply to all the purchases of plant and of materials used for construction, repairs, or purification.

Again, it is to be feared that few auditors take any steps to ascertain whether the figure which appears in the cash book as being the amount of dividends paid, actually does represent the aggregate of the dividends paid to the shareholders, or whether the amounts of the holdings of the proprietors as registered in the books total up to the actual capital of the Company. The necessity for testing these figures arises from the fact that there is usually, in a big company, a sufficient balance of dividends awaiting the claim of ignorant or unknown proprietors, to pay a considerable dividend to a fraudulent staff on non-existent capital. What auditor of a company with over 2000 shareholders has ever taken any step to test the accuracy of the dividends paid?

As to the wages bill (which usually represents an amount equal to, or greater than, the profit to the shareholders), the examination of it rarely amounts to more than a little practice in addition, in casting up the total weekly amounts reported to have been paid by the works officials. In how many instances do auditors test the rates of pay at which the men are reported to have been paid with the rates sanctioned by the board of directors? If, therefore, the works staff shows payments to stokers at 1d. a day more than the men have actually received, or the directors approved, the auditors (and so the shareholders) are none the wiser.

After having in such fashion "satisfied" themselves as to the correctness of the cash book, the auditors (we are speaking throughout of what we believe to be the usual type of auditors) then proceed to the second stage of the process, which, when completed, justifies them, in their opinion, in certifying the accounts to be correct. This second stage consists in comparing, most carefully and particularly, a few final books of the concern with each other and with the semi-final books, the accuracy of which the auditors apparently never dream of testing. For the correctness of these semi-final books, and of other subsidiary returns or accounts leading up thereto, the signatures of the very men whose honesty it is the auditors' duty to prove, are considered by them trustworthy and sufficient guarantee.

This audit—save the mark!—then terminates in the examination of the balance-sheet with the final books, which have, as we have said, been carefully compared with semi-final books, whose contents might, as a rule, so far as the auditors, by their own examination, are aware, be falsified from start to finish. The accounts are then signed and presented to the shareholders, whose grateful thanks are returned to their able auditors, who are unanimously re-elected by an admiring general meeting.

To further demonstrate the value of such a system, let us for a moment consider one or two of the items in the statement of Assets and Liabilities.

Coals, Residuals, and Stores in hand. How do the auditors know, of their own personal knowledge, how many tons of coal, coke, or sulphate are in stock, or how do they ever practically test the statements of these and other stocks laid before them? [It is only necessary to turn to the proceedings at the recent general meeting of the Sheffield United Gaslight Company to see that this question is not merely academical.] We do not think that many works officials would know an auditor if they saw one. Further, are the evaluation prices ever compared with market rates?

Accounts due from Consumers and other Debtors and to Creditors. Are these enormous figures ever efficiently tested? For instance, do the auditors ever in any practical way satisfy themselves that the quantity of gas reported to have been sold has been properly charged, at the proper prices, to the consumers, and that the amount shown as unpaid is actually owing by them? We are afraid that the answers to all these questions must, in most cases, be equally unsatisfactory.

The extreme importance of a proper audit of these items in the balance-sheet will be realized by a glance at the following figures, taken from the accounts of the three Metropolitan Gas Companies for the half year ended Dec. 31, 1897:—

Company.	Stores in Hand.	Accounts Due to the Company.	Accounts Due by the Company.	One per Cent. on Ordinary Stock for Half Year.
Gaslight and Coke .	£540,591	£1,003,182	£367,402	£29,611
South Metropolitan.	184,089	329,653	144,036	11,062*
Commercial . . .	45,852	97,978	30,651	3,753
Total . . .	£770,532	£1,430,813	£542,089	£44,426

* On stock prior to conversion.

These figures show that a falsification of either 5·8 per cent. on the stores in hand, 3·1 per cent. on the accounts due, 8·2 per cent. on the accounts owing, or of 1·6 per cent. on the aggregate of these several items, would have been sufficient to have enabled these Companies to have paid the rate of dividends sanctioned by the sliding-scale on their ordinary stocks for that half year, even if they had failed to earn them by 1 per cent. on those stocks.

We think we have now sufficiently demonstrated the absurdly futile character of the system of company auditing generally in vogue; and we need scarcely point out how valueless and, therefore, how mischievous are the certificates which are signed on the strength of such examinations.

(To be continued.)

THE WORKING OF VENTILATION SYSTEMS.

A VALUABLE report to the Local Government Board, by Mr. W. N. Shaw, Lecturer in Experimental Physics in the University of Cambridge, treats exhaustively of the ventilation and warming of certain of the Metropolitan Poor-Law Schools. The report has been published as a Blue Book; and it is to be commended to the notice of those architects and engineers who desire to learn the facts as distinguished from the theories and plans of ventilation for public buildings. There is nothing with which the members of these professions are more familiar than with schemes and systems of ventilation; and there are few matters regarding which so little is really known as the way in which such arrangements actually work, especially after the buildings have been in use for some length of time. Mr. Shaw had an exceptional opportunity for increasing the sum of professional and public information respecting this matter, when the Local Government Board directed him to carry out a thorough investigation of the ventilation and warming of the dormitories, workshops, and other rooms of certain typical schools. It is enough to say that the opportunity was not thrown away.

Mr. Shaw divides the conditions of the ventilation of interiors into two categories—primary and secondary. The former embraces the provision of adequate air-inlets, air-outlets, and the necessary motive power for ensuring that these openings shall fulfil their office. The latter relates to the quality of the air supplied, as regards freshness, cleanliness, and temperature; and also to its proper distribution. These conditions are not stated in the order of their importance, but only for convenience of consideration in turn. Practically, the conditions are of quite equal importance. The report sets out Mr. Shaw's scheme of operations. His apparatus was of the simplest and scantiest, including, besides thermometers and air-meters, some fumigating pastilles for indicating the direction of the air currents. His method of conducting the inquiry seems to have been admirable. He did not expect too much, but directed his attention chiefly to ascertaining whether the arrangements existing were such as could be made to answer their purpose by moderately intelligent persons desirous of using them. Thus, where he came across ventilators deliberately or accidentally stopped up or disused, he merely inquired the reason without attempting to criticize the proceeding. A pertinent reflection which seems to have often occurred to Mr. Shaw was that those in charge of the school buildings did not generally understand the working of such special ventilating arrangements as might be provided. The architects might devise ingenious plans; but after a while the people would lose the key to them, and it was nobody's business to see to their use.

Mr. Shaw dismisses air bricks and Tobin tubes as air inlets or outlets, by showing that whatever effect they may be able to produce may be secured just as well by very slightly opening a sash window. With regard to exhaust-flues in chimneys—a very general plan of extracting foul air from apartments—all these arrangements are classed as examples of natural cold-air ventilation, and as such must act capriciously, if at all. Besides the wind, the other usual ventilating agent is the open fire. A full-sized chimney with a good fire may remove 20,000 cubic feet of air per hour, if sufficient inlets for fresh air are provided. Unfortunately, this usually means draughts in the room and the most active extraction during the coldest weather, when it is least needed. There are Galton grates and others, which supply

warmed air to the room; but here again the factor of ignorance and carelessness only too often appeared in evidence, and the apparatus did not have fair play. In many places steam or hot-water radiators are introduced to supersede or supplement the open fireplace. These are effectual for their primary purpose, but are inimical to ventilation.

Mr. Shaw utters a warning in regard to the placing and working of steam and hot-water radiators which engineers and architects should bear in mind. As very often fixed, there is little or no provision made for the proper cleaning of the radiators; and they consequently get fouled with dust. It seems a simple rule that the sweeping-brush and the duster should have access to every place; but it is nevertheless a rule that is very generally ignored. Persons in charge of buildings usually regard steam or hot-water heating, supplementary to open fireplaces, as an improvement; but Mr. Shaw bluntly says that the judicious use of any arrangement less automatic than the open fireplace calls for more intelligent control and more instructed care for such considerations as temperature and freshness than is usually to be found associated with the working of the apparatus. A vexed question is that of the efficiency of "extraction ventilators" inserted into smoke-flues near the ceiling of rooms. Mr. Shaw certifies that three such arrangements in the Hanwell School block were extracting 8200, 5800, and 9200 cubic feet of air respectively per hour. "As these open into the chimney-flue, and depend for their effectiveness upon the flue which already has an opening at the bottom, the draught of air which passes through them is not a mere addition to the ventilation, it is at least to a large extent in substitution of air which would have passed up the flue over the fire; but as they draw their air from a higher level than the fireplace opening, they are useful in removing the fumes of gas or other impurities which collect near the ceiling."

Where steam or hot-water heating is employed, it is usual to press the economy of space too far. "The pipes require a proper allowance of room, in order that the radiation from them may not be interrupted, and also in order that they may be regularly and frequently cleaned." To run heating-pipes in a trench over which people walk, or to run them along the side of a room and cover them with a bench, are ordinary practices; but they are bad. Mr. Shaw notices that a common fault of school buildings—and the remark applies to offices—is the liability to overheating by the sun in summer. There is too much glass facing the sun; and sunblinds are too little used in this country. Mr. Shaw proposes as a rational test for the efficient ventilation of sleeping rooms, that the interior temperature should follow the external temperature throughout the night quite closely. If the room temperature rises during the night and drops suddenly when the windows are opened, there is something altogether wrong with the ventilation.

Unfortunately, there is no instrumental means available for indicating the state of the air of rooms as regards freshness, as there is for the temperature. "Until some handy and automatic contrivance is devised for registering the state of the air as regards purity, ventilation, with proper regard to temperature, will always require careful, tedious, and troublesome attention on the part of those in charge of a building." In all the schools visited by Mr. Shaw "the universal illuminant is gas." It is remarked that, in arranging for ventilation, allowance ought to be made for the air required on account of the artificial lighting. Mr. Shaw thinks it is better to have the gas fumes led away directly from the room by a suitable flue, which strikes one as a "counsel of perfection." Surely, the extraction ventilator system already mentioned should suffice. With regard to the use of gas-flames for promoting air currents for ventilation, the only direct mention made of it by Mr. Shaw is for the ventilation of closets or lavatory annexes. These are necessary; but it is difficult to ensure that the air shall never draw from them inwards to the occupied portion of the buildings. It is therefore suggested that provision should be made for a flue leading from near the ceiling of each closet up to and above the roof, and for a gas-jet so arranged that the heated air passes directly into the flue, but not so that the gas-jet is contained within the flue itself, nor so that all the air passing into the flue goes past the gas-flame. "A lantern with a chimney, narrower than the flue, ending just at the commencement of the flue, would be satisfactory."

The problem of the effective ventilation of school class-rooms is a difficult one to solve otherwise than by the mechanical method. Dr. Carnelley discovered this some time ago; and Mr. Shaw quotes with approval Carnelley's statement that "a 4-foot Blackman fan at King Street School, Aberdeen, driven by a 3½-horse power gas-engine, delivers upwards of 1,000,000 cubic feet of air per hour for the ventilation of the school; so that there is no difficulty in providing the necessary air supply on the mechanical system." Mr. Shaw describes and discusses the usual other methods of warming and ventilating large apartments occupied by a great many persons, only to conclude that it is practically impossible to warm them to the regulation 59° Fahr. in cold weather, and yet keep up a sufficient supply of fresh air, by other than mechanical means, which should be in addition to the existing ventilation openings; these becoming outlets.

Altogether, we can commend Mr. Shaw's report to the careful attention of all engineers and sanitarians who are interested in knowing, not merely what ventilating and warming apparatus is commonly in use for the important class of buildings he deals with, but how it works. Designers will find in it a salutary reminder that their best intentions may be frustrated by the ignorance and heedlessness of those into whose hands the arrangements come in the course of time. Mr. Shaw discovered a large number of air-channels the existence of which had been forgotten; and many parts of stoves and radiators were found to have portions removable for cleaning that had been supposed to be fixtures of the most permanent description. He is a strong partisan of the open fireplace, but is not blind to its defects. If the room is very large, the warming effect of the fire may be supplemented by steam or hot-water radiators, placed openly under the windows. Where gas is largely used for lighting, means should be adopted for removing the hot products of combustion from the upper part of the room, either by special air-extraction shafts, or by flap extractors opening into the smoke-flues. There is the risk, of course, of these outlets acting in the opposite sense, when the supply of air into the room through the proper inlets is insufficient; and Mr. Shaw makes the useful suggestion that a little tell-tale flag of mica, forming part of the main flap, might be made to show which way the air is going. Hinged horizontally at the top, the flag would be invisible while all was going right, but would stand out if the air were entering by the opening. The air supply to the fireplaces should be from outside, by openings at the back. The general air supply to the room is best provided by the windows, if that entering round the grates is not enough. Mr. Shaw lays a good deal of stress upon his tell-tale extraction flaps, as offering a simple and certain indication of the working of the ventilation cycle, by any system that might be employed.

THE CHEMIST ON COKE MAKING.*

The destructive distillation of coal as carried out in coke-ovens has not so far been the subject of exhaustive treatment at the hands of English chemists. We gather from the preface to the *brochure* in our hands that Mr. W. Carrick Anderson had it in his mind to deal with the chemistry of coke making in an original work; but that while his scheme was yet *in embryo* he lighted upon Herr Simmersbach's treatise, and was persuaded to substitute a translation of it for the handbook he had at first intended to write. Translation of a work dealing with the technology of an industry which has reached a high degree of development in the author's country, into the language of a country where the industry comparatively speaking is in a retrograde condition, is a task fraught with many difficulties. The author had at his command up-to-date technical terms for which the translator cannot find intelligible equivalents. In such a case, the temptation to attempt to import the original terms into a language whose genius repels them, is sore; and the translator seldom resists it. Mr. Anderson, however, escapes our censure on this head; and he has produced a sufficiently well-written English version of Herr Simmersbach's work. We wish that he had adhered to his first idea of preparing an original handbook; for in the German treatise typical English coals necessarily are less fully dealt with than the Ruhr and Saar coals, which are indeed the backbone of modern German industries, but are known here only by repute. We have observed only one serious fault in the translation, and that is the retention of the Continental method of expressing the yield of gas from coal. Had Mr. Anderson converted "cubic metres of gas per 100 kilos. of coal" into "cubic feet per ton," he would have saved his English readers some trouble, and his work a glaring inaccuracy. From a table on p. 35, we learn that 100 kilos. of various coals yield from about 23,000 to 27,000 cubic metres of gas, which means that 1 ton of coal produces from 8 to 10 million cubic feet of gas! Had the English terms been used in the translation, the error would have been too obvious to escape detection. The comma, which is the sign of the decimal point in foreign works, has proved a pitfall to many before Mr. Anderson.

The book comprises seven chapters, of which the last, dealing with the methods of examination of coal and coke, is not in the original, but has been written by the translator. The first chapter treats of the uses of coke, and comprises a much laboured plea for the general employment of coke as fuel on locomotives. The next chapter is on the coking property of coal, and brings together the views of many theorists without such co-ordination as would give the more acceptable theories the prominence they deserve. In the third chapter, on the process of coking, more should have been said on the types of oven; and the chemist might with advantage have secured a collaborateur to give brief but lucid descriptions of the structural differences between prevalent types of coke-ovens. The fourth chapter, on the chemical composition of coke, is the kernel of the work, and withal the best portion of it. The relations observed between the amount of sulphur in coke and the nature of the basic constituents of the ash, are very well stated. In fact, a discussion of desulphurization processes leads the author back to the conclusion that the best means of securing coke low in sulphur is to select the coal with a due regard to its

* "The Chemistry of Coke;" being the "Grundlagen der Koks-Chemie" of O. Simmersbach, translated and enlarged by W. Carrick Anderson, M.A., B.Sc., Assistant and Demonstrator in Chemistry at the Glasgow University. Glasgow and Edinburgh: William Hodge and Co.; 1899.

quality and its content of ash, and especially to the amount of iron in the latter. The gas engineer also knows that "it is not lways the coal that contains least sulphur which yields the coke purest in this respect." The fifth chapter treats of the hysical properties of coke; and the sixth chapter, chiefly of its calorific value.

In the present state of knowledge of coal and its composition, and of the phenomena of destructive distillation, this little work must be regarded as affording a good study of its subject; but we lay it down with a feeling of regret that we still know so little of the principles underlying the production of foundry and blast-furnace coke.

PERSONAL.

Mr. E. A. Cowling, Manager of the Honiton Gas and Coke Company, Limited, has been appointed to the secretaryship, in the place of Mr. R. Tucker, resigned.

Mr. R. B. Simmers, Assistant to, and late pupil of, Mr. W. A. Valon, at Ramsgate, has passed the qualifying examination for associate membership of the Institution of Civil Engineers.

Mr. John Smith has resigned the position of Secretary of the Long Eaton Gas Company, and has been elected a Director. Mr. G. Stevenson, who has been his assistant for the past ten years, succeeds him in the secretaryship as from Midsummer.

Mr. G. F. Andrews, Deputy-Manager at the Swansea Gas-Works, has taken a good deal of interest in the working of the Ancient Order of Foresters Court to which many of the employees belong; and they have recognized his services by presenting him with a handsome emblem and a portrait of himself.

Numerous readers will unite with us in congratulating Mr. Henry Woodall, eldest son of Mr. Corbet Woodall, upon his marriage with Miss Bertha Nettlefold, daughter of the late Mr. Edward John Nettlefold and of Mrs. Nettlefold, of Edgbaston, Birmingham. The happy event took place in that city, on the 23rd ult. Mr. Henry Woodall, it may here be mentioned, has recently entered into partnership with his father.

On the occasion of the annual dinner of the officials in the Gas and Electricity Departments of the Glasgow Corporation, which took place last Wednesday, under the presidency of Bailie Mitchell, Mr. R. B. MacCall, Accountant in the Gas Department, who, after twenty-five years' service, is about to relinquish his post in order to become Chief Clerk in the Electricity Department, was presented with a handsome gold watch, subscribed for by his colleagues. The company numbered about a hundred; among them being Mr. W. Foulis, Chief Gas Engineer; Mr. Chamen, Electrical Engineer; and Messrs. A. & J. Wilson.

OBITUARY.

The death is announced, at an advanced age, of Mr. Isaac Hart, who was formerly a merchant and importer at Melbourne, Victoria. For forty years continuously he was a Director of the Metropolitan Gas Company of Melbourne.

A few days ago, Mr. John Battersby, the Clerk to the Leigh and Hindley Joint Water Committee, died suddenly in a chemist's shop at Westhoughton. Feeling rather unwell, he entered the shop to procure some medicine; and shortly after taking a draught he fell from the chair on which he was sitting, and died before a doctor's assistance could be procured. Deceased, who was 57 years of age, had full charge of the mains and reservoirs of the Committee in Westhoughton.

It was with sincere regret that we received the sad news last Thursday of the death, on the 18th ult., of Mr. Thomas Stanley Cleminshaw, the Engineer and Manager of the Colombo Gas and Water Company. It is a curious coincidence that in the number of the "Journal" for the 5th of April last year we recorded Mr. Cleminshaw's success in his application for the appointment which his death has rendered once more vacant; and before he left England to take up his duties, we had the pleasure of personally expressing, as his many friends had done, our best wishes for his prosperity in his new sphere of labour. It was not long before he furnished evidence of his desire to be useful outside that somewhat restricted sphere by contributing to our columns an article entitled "Wayside Notes;" and just on the close of the year we were in a position to announce that his Company had secured the monopoly of the supply of electric light in Kandy, the hill capital of the island. So that, although he was not to be the Engineer of this scheme, there seemed to be an opening for acquiring additional experience. But this was not to be. Before obtaining the Colombo appointment, Mr. Cleminshaw was resting in England at the conclusion of his engagement with the Launceston (Tasmania) Gas Company, whose Engineer he had been for nearly fourteen years. It was financial rather than technical difficulties which led to the separation, which took place early in 1897 with expressions of the utmost good feeling on the part of the Directors and the workmen, from whom he received testimonials. Prior to going to Launceston, Mr. Cleminshaw was Manager of the gas-works at Christchurch, New Zealand. While there (in 1876) he joined The Gas Institute; and it may be remembered that at the meeting in London in 1894, he contributed a paper on "Gaseous Fuel in the Retort-House." He was also an associate member of the Institution of Civil Engineers; his connection with that body dating from 1884.

NOTES.

The Flow of Compressible Gases in Pipes.

Certain aspects of the distribution of gases and steam through pipes are discussed by Mr. W. Cooper in a paper contributed to the "Engineering Magazine." The author remarks that the imperfection of the science relating to the flow of gases in pipes is displayed in a recent engineers' hand-book, by the deductions to be drawn from a table of the loss of head in the transmission of compressed air through pipes. From this table, it can be shown that it is economical to transmit compressed air at a higher pressure than that required at the outlet; allowing the extra energy stored in the air to escape. In one case, a five-fold increase in the terminal pressure decreased the initial pressure to one-tenth of what it was before the increase of terminal pressure. The error was due to neglect of the consideration of the compressibility of the air. The formula used assumes the velocity of the air throughout the entire pipe to be the same as at the outlet. Mr. Cooper states that in transmitting a given quantity of compressible fluid through a given pipe, the higher the terminal pressure the less the loss in transmission; for the reason that the velocity is less, owing to the increased density. The density of a perfect gas varies inversely as the pressure; and, since the velocity through any given pipe, while transmitting a given weight per minute, varies inversely as the pressure, the velocity varies directly as the density. The loss in head or pressure due to the resistance of the pipes varies as the square of the velocity. The loss of head or pressure in the transmission of compressible fluids through pipes increases as the terminal pressure is reduced. In the flow of liquids through pipes there is one factor that does not change—the velocity is uniform throughout the pipe. For a steady discharge there is only one variable factor—the resistance, depending on the size and kind of piping. In the transmission of liquids through pipes the loss of head is a constant, regardless of pressure; while with gases it varies with the pressure.

The Fatigue of Metals.

It is beginning to be understood why parts of structures, especially machines subjected to continuous or sudden strains, need to be of so much greater scantling than the recognized strength of the material would seem to indicate as necessary. One of the first things an engineering student learns is the breaking strength of the different materials used in construction; and the next thing he cannot help observing is the lack of correspondence between this elementary information and the proportions given to actual machines by accredited makers. No mathematical aptitude will enable the student to calculate the dimensions of the parts of machines, or of certain structures, merely with regard to the actual stresses to be borne by the material. One of the reasons for the observed discrepancy is the quite modern discovery of the liability of metals to "fatigue." When Wöhler's first experimental investigations into this question were published, many very eminent engineering authorities denied the existence of any such liability—holding that, so long as metals were never strained beyond the limit of elasticity, they could not suffer any diminution of strength by use. Yet, in spite of this opinion, steamers' propeller-shafts continued to break unaccountably; and chandeliers, and even pictures that had hung long upon their chains and wires, would fall while the pieces of broken metal appeared as strong as ever. It has now come to be understood that Wöhler was right; and that a repetition of stresses below the ultimate strength of the material will cause rupture in time, unless fully allowed for. Mr. Seaman has recently stated this problem before the American Society of Civil Engineers; and has arrived at the broad conclusion that safety can be assured by doubling the live load on structures and adding it to the dead load. This does not touch the question of durability under constant strain, except indirectly. Mr. Seaman, however, believes that there is ground for a general theory of work and endurance—that the material starts with the capability of doing a certain amount of work, and when this amount is exceeded, the material becomes fatigued and its tenacity is impaired. "Under these circumstances, the destructive effect of live strain may be considered as bearing a certain relation to that of dead strain; and in the experiments on wrought iron that effect would seem to be about in the ratio of 2 to 1 for all cases."

The "Builder" on the Advisability of Supplying Unenriched Gas.—Dealing, in a recent issue, with the proposal of the London County Council to legalize the portable photometer, the "Builder," to whose sound views on questions relating to gas supply we have on several occasions had to refer, remarks that to get 16-candle gas under any conditions likely to obtain when tested by that photometer the gas would have to be enriched to a greater extent than at present, and the writer says "the game is not worth the candle." He points out that "the expense of enriching, which has, of course, eventually to be borne by the consumer, is out of all proportion to the increased value of the gas. For heating purposes, or for use with incandescent burners or the albo-carbon light, the increase in efficiency of 20-candle gas over 15-candle gas is comparatively slight." Our contemporary strongly advocates "the supply of unenriched coal gas, at the cheapest rate possible, in preference to the supply of a richer gas at a considerably higher price."

COMMUNICATED ARTICLE.

EXPERIENCES WITH THE INCANDESCENT GAS-LIGHT.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

The fact that the new pattern Welsbach burner is one of the most important discoveries of the age, in connection with the practical sale of gas, may appear at first sight to be so well known as to render repetition needless. Yet, like many other facts that are taken for granted as coming under the heading of every-day knowledge, it is not appreciated at its full value by the majority of gas consumers, by the majority of directors of gas companies, and, I may almost add, by the majority of gas-works managers. Ordinary flat-flame burners may be taken as capable of yielding an efficiency or duty equal to 3 standard candles per cubic foot of gas consumed per hour. The argand will give something more; and by the adoption of costly, cumbersome, and unsightly regenerator appliances, this duty may be doubled or trebled. But the new pattern Welsbach which can be attached to any ordinary pendant or bracket with as much facility as a flat-flame burner, will yield a duty equal to ten times that of the the flat-flame, or 30 candles per cubic foot. And yet many gas companies treat this remarkable fact with comparative indifference. What a different reception would surely have awaited an invention of equivalent value in almost any other branch of engineering!

Various explanations in excuse of this line of conduct may be forthcoming. Some do not like the methods of business adopted by the vendors of the burners, some fear that the mantles are too fragile, and that the difficulties in the matter of maintenance are insuperable; while others imagine that the largely reduced rate of consumption, as compared with other kinds of burners, may become unpleasantly prominent in the rental-book, and express a preference for appliances that will use more and not less gas. The plan of appointing one agent in each district does not work well in practice; unless that agent is also directly interested in the sale of gas. The only benefit to an ordinary tradesman is the profit on the sale of appliances, together with some indirect advantage in the way of introducing general gas-fitting business. It might be supposed that the value of the exclusive privilege would be sufficient to induce him to adopt special methods in the way of advertising, canvassing, or otherwise pushing sales and working the thing for as much as it is worth. But I do not think that this is realized in practice. As a general rule, the exclusive agent simply exhibits the samples and show-cards in his window or over the counter; and waits for the customers to come in. The result is that the agent's business is principally among his own connection Most people are accustomed to keep to their own particular plumber or gasfitter, and (with the exception of the clients of the exclusive agent) if they ask for incandescent burners he does not care to refer them to another tradesman, or to own that he cannot supply them. Therefore he enlarges on the defects of the system, and endeavours to substitute some other appliance from his stock. Parties who have already purchased and used the incandescent burner, meet with the same sort of reception when they inquire for new mantles. They do not want to go to the other end of the town to get a mantle, but call in at the nearest shop—with the results above indicated. While one tradesman only in a town is setting forth the advantages—and that in a perfunctory manner—the remainder are advertising, with a very much greater degree of energy, the disadvantages of the system. The consequence is that the breakage of mantles and chimneys is far more widely known and appreciated, than the steadiness and cheapness of the light. The exclusive agent system is a first-rate means of advertising the drawbacks and deficiencies, and for giving the general public an exaggerated notion as to the cost of the upkeep of the system and other disadvantages; and I do not think it is too much to claim that exaggerated impressions of this sort do prevail. It has lately fallen to my lot to discuss the question of lighting the streets by means of the Welsbach system, with "all sorts and conditions of men;" and popular ideas as to the cost of upkeep are remarkable. The assertion that we expect to do with less than six mantles per annum per lamp is usually received with derision as a piece of extravagant trade romancing; and the general idea tends towards four or five times that number. With private lighting the same thing may be observed. State that the cost of mantles, &c., is much less than the saving of gas, and that the new system can be worked, upkeep included, at a considerable saving on the flat-flame burner, and two consumers out of three will at once tell you that just the contrary is the fact.

This is not the only, or indeed the most important, defect of the exclusive agent system. If the agent is not interested in the sale of gas, he has no inducement to teach the customer the precautions necessary to ensure the proper working of the appliance; such as the need for periodical cleaning and blowing out, or for undertaking any responsibility in the way of maintenance. Many purchasers have obtained an incandescent burner, and possibly undertaken to "put it on" themselves, under the impression that it can be left to take care of itself for ten or twelve years, as they are accustomed to do with flat-flame burners. These customers get landed between two stools—the district agent and the gas company. The agent will not help them himself; and, with a dog-in-the-manger like spirit, objects to the gas company or anyone else doing so. And the gas company, even if they have the inclination, have not recognized the need; and have no organization capable of dealing with such cases. Meanwhile, the incandescent burner is being rejected in many cases as too troublesome for ordinary house or business use; and each case goes to swell the ranks of those who talk about "30 mantles a year." The only effective way of checking this undesirable movement is the introduction of a system that should ensure the periodical inspection of the burners; their maintenance in a reasonably clean and unobstructed condition; and the prompt renewal of mantles *when necessary*, and not before. The only parties who can do this are those who are interested in the sale of gas. The district agent does not mind renewing mantles by the dozen, but does not think one or two worthy his attention. I have known instances where he has attended to this department with unnecessary liberality, with the result that the consumer soon begins to think that the incandescent is an expensive system.

It is true that there are a large number of accessories, such as draught screens, anti-vibrator devices, &c., many of which possess considerable value. But it is not always that the district agent takes sufficient interest in the matter to make himself acquainted with these articles, to a sufficient extent to be able to advise as to their use, or when they may be applied with advantage. Nor does he, as a rule, trouble much about the question of pressure, or know when a pressure-regulator is needed or not. Consequently, the system has been tried and rejected as unsatisfactory, when a pressure-regulator, or a draught screen, or an anti-vibrator would have secured a very different result. All this goes to show that, if the incandescent system is to be permanently established to a degree anything like that which is warranted by its merits; the parties who are interested in the sale of gas must take the question of maintenance in hand, and must train men to the special work. A knowledge of the capabilities of the accessories is very necessary, but it is in no sense a substitute for the maintenance scheme. It will not replace systematic attention and inspection.

Customers who take up the system for the first time, with no previous experience of it, should be made to understand that the results of the first few weeks working do not afford a fair criterion as a basis for calculating out the cost of upkeep and mantles per annum. As with other things, they must buy their experience; and at first several mantles will be broken through inexperienced or careless handling in connection with lighting, extinguishing, and cleaning. This is always the experience in introducing the system for public lighting. During the first few weeks, the consumption of mantles and chimneys is considerable; but as the lamplighters get used to the new arrangement, the thing settles down to a normal rate. If a case of frequent breakages is taken in hand by an experienced man, a large reduction is the invariable result. Inquiry shows that the consumption of mantles is very unevenly disposed. One lamp goes on without trouble from month to month; but with another one or two broken mantles per week is the regular experience. The usual finding is that the large consumption is confined to a comparative small number; and striking these out, the average is not excessive. Particular attention should be directed to the most troublesome culprits, and the draught screen, governor, or anti-vibrator affixed, as experience may indicate. These difficulties having been put right, the thing settles down on a normal basis; and the cost of upkeep proves to be much lower than the first experiences would lead one to expect. The experienced hand is useful in many departments—such as the retort-house, the boiler-house, &c.—and is able to secure working results that seemed simply impossible at first. And with no speciality is this peculiarity more marked than the one now under consideration. At first sight, it seems impossible for a gas company to carry on a maintenance scheme without loss, except by charging rates that are simply prohibitive; but the results during the last few months are so encouraging that I believe, as experience grows, the cost of maintenance will be so reduced as to enable it to be profitably undertaken at merely nominal rates.

One reason for the indifference on the part of the gas interests to which attention has been drawn, is a sort of lethargic condition which is engendered by a surfeit of full dividends. The attitude of the prosperous undertaking that has enjoyed this privilege for a number of years, is in marked contrast to that of the struggling concern that has to regard dividends as among the things of the future. But let the prospect of competition fall across its path—such as the adoption of an electric lighting scheme by the municipal authority of the district—and a rude awakening at once takes place. The fragile nature of the mantle is at once forgotten, the possible effect on the rental-book is overlooked, and the word at once goes forth that something must be done. Competition of this sort is yet perhaps more the exception than the general rule. The exaggerated claims put forth by promoters of electricity supply companies have illustrated the possibility of this; and with the advance of scientific knowledge, it may be expected to increase and become more general. Surely it is better to move steadily into line with the general advancement that is the characteristic of the age, than to hang back for awhile and then rush up with a sudden start. The rapid change of policy not only excites ridicule, but is likely to be attended with blunders and errors that are inseparable from inexperience, and which could have been avoided by a more accurate reading of the signs of the times. The Irishman's "one step forward and two back-

ward" may be impossible in a strictly literal sense; but they are frequently aptly illustrated by mistakes that are made in connection with business enterprise. So some who at present repose luxuriously on the faith that the security of the past will extend indefinitely into the future may one day wake up to find themselves a long way to the rear, and possibly hopelessly behind in the race. Even where no sign of competition is at present evident, the peaceful times may be profitably utilized in getting into trim for the campaigns that may be expected in the future. Other agents are being extended and developed; and we cannot tell the dimensions they may eventually attain. Nor is there any means of indicating the prospects in store for gas, under the more energetic *régime* that will have to come. If gas had been advertised, canvassed, pushed, and studied in every practical detail during the last ten years to the same extent as has been done with electricity, where should we stand to-day? To say that sales would be doubled, is to say the least.

But though very little has as yet been really accomplished, signs of a general rousing are not wanting. One cannot peruse the technical press of the gas industry without observing the prominent position accorded to all efforts in the way of extending business, and to new burners and accessories. Time was when all efforts appeared to be directed towards the saving of a penny per 1000 cubic feet in the retort-house, or a farthing per 1000 cubic feet in the purifier-house, to the exclusion of all topics relating to consumers and consumption of gas. The Salisbury Gas Company have lately entered upon an advancing policy; and if one may judge by the inquiries received, and the visits of inspection made by friends in the profession and by parties interested in improved lighting, the attention directed to movements of this nature is more widely spread than the facts above indicated would lead one to suppose. Therefore a few experiences from practical working, both in public and private lighting, may be acceptable to those who as yet have had but little to do with the incandescent system. In approaching the subject, it is important to remember that lighting by incandescence—which may be defined as the utilization of the heating rather than the illuminating properties of the gas—is at present quite in its infancy, if one may borrow a somewhat hackneyed phrase. It is only a creature of the last few years, as it cannot be said to have come into the bounds of practicability before that time; but notwithstanding the difficulties it has had to encounter, it now represents an important branch of consumption. From inquiries recently made, there is good reason to believe that a sufficient number of incandescent burners have been sold in Salisbury to represent more than one-fifth of the total number of flat-flame burners in use. Although the time when gas will be valued for its heating properties only is not yet within hailing distance, it is well in sight. Many other things are also still in their infancy; and not likely to advance beyond that interesting stage for a long while to come. But the incandescent gas-light is not to be reckoned within this category. On the contrary, it is growing rapidly, and affords wide scope for immediate encouragement and development. The jump from 10 up to 30 candles efficiency, in a comparatively short time, warrants the expectation that the ultimate limit in this direction is yet a long way off. The progress as regards desirability of mantles has been sufficiently marked to enable the same argument to apply; though perhaps to a less extent. As it is, the demand for incandescent appliances is of sufficient importance to act as a powerful incentive to the progress of invention. So no one need hang back for fear of being involved in a losing game. A member of the New England Association of Gas Engineers took up the topic of "Possibilities" at the recent meeting. Following his line of thought, one may ask: What are the possibilities as regards the incandescent light? Is it unreasonable to hope for a mantle, as tough as a piece of paper, that can be retailed at about 3s. per dozen? Is a self-lighted contrivance beyond the range of "possibilities"? Whatever the answer to these questions may be, the incandescent gas-light has come to stay; and the efforts of all concerned in the sale of gas should therefore be directed to encouraging the demand for it in every possible way.

(To be continued.)

The International Acetylene Congress which is to be held in Buda-Pesth next month in conjunction with an exhibition of appliances for the production of this gas, promises to be highly successful. At a recent meeting of the Executive Committee, the President (M. Maurice Gelléri) read letters from foreign scientific men who promised a good number of papers on the various questions affecting the acetylene industry. The applications received for space at the exhibition show that it will be a very representative one.

The Real Value of Acetylene as an Illuminant is discussed in an able article in the current number of the "Engineer." The author takes the case of a country house where an installation of acetylene is put up in place of five large and five small paraffin lamps, with carbide at £20 per ton and petroleum at 8d. or 10d. per gallon, and he arrives at the following results: Increase of light, 67 per cent.; increase in cost, 192 to 242 per cent.; decrease in carbonic acid, 83 per cent.; decrease in heat, 66 per cent. He comes to the conclusion that, for domestic illumination, acetylene is infinitely superior to everything, except the incandescent electric light and the Welsbach mantle.

TECHNICAL RECORD.

RECENT DEVELOPMENTS IN THE GAS-ENGINE FIELD.

At a Meeting of the Technical Society of Pittsburgh (Pa.), Mr. E. Ruud gave an address on the above subject. It was published in a recent number of "Engineering," from which the following extracts have been made.

Gas-engine engineering is a peculiar and difficult line—probably one of the hardest branches in the entire mechanical field of to-day. This you will understand when you stop to consider that the temperature in the cylinder during the explosion periods is a dazzling white heat, and that many parts are exposed to this high temperature. Add to this the different behaviour of the various kinds of gases, and the fact that the whole process is going on within closed doors, so to speak, where you have very little chance to see what is taking place, and you can imagine the difficulties of the problem. It is a wonder that an engine can be made to run satisfactorily under such conditions. It requires a constant association with the subject in order to fully understand, and to be able to overcome, the numerous difficulties which present themselves. These increase with the size of the engine, and are due to the fact that the heat problem becomes more and more troublesome to solve. It is for this reason that the gas-engine has not made much headway in the larger sizes. Also, few men have been willing to experiment in large sizes of gas-engines, in view of the uncertainty and the abnormally heavy expense connected with the development of (say) a 1000-brake horse power gas-engine.

In the course of this short talk, I shall confine myself to two classes of engines now in use, and shall endeavour to explain or make clear to you the workings of these two kinds of prime movers. This classification is made with regard to the mode of regulation, the cycle being the same in both—the "Otto" or "Beau de Rochas." In fact, this cycle is about the only one used to-day commercially. I shall try to point out the advantages and the disadvantages of those two classes in order.

Having, by means of sketches on the blackboard, explained the first principles of gas-engine design, the lecturer proceeded to describe the type which had, he said, until recently, been exclusively made—viz., the "hit-and-miss" engine. He pointed out that, by the mode of governing employed, one or more charges might be cut out, and that the engine either took in a full charge of gas and air or omitted the gas altogether, as the gas-valve stem was only in position to be operated by the cam when the engine was running at or below normal speed. He said his audience would readily understand why the "hit-and-miss" type of engine was not suitable where a uniform speed was required; and but few of this type were running in connection with dynamos for electric lighting purposes. It had one disadvantageous feature—viz., that the charge was always ignited under the same pressure; and hence the actual work done by the exploding gases in a given cycle was practically the same for a full load as for no load.

Mr. Ruud went on to say: Recent developments have proved that a modern type of gas-engine is admirably adapted for electric lighting, as its economy is very high, and its speed regulation, in a type to which I will refer, has been made as good as that of a first-class steam-engine. It is the electric business which has stimulated the experiments in the direction of producing a gas-engine which would be suitable for incandescent lighting work. The engine I refer to is in contrast to those of the "hit-and-miss" type, as it proportions the charge to the load. The gas and air are mixed in a cylindrical mixing-valve in the proper proportions at which the same is set; and the governor in connection with the valve has absolute control over the amount of explosive mixture to be taken into the cylinder. The charges are ignited by an electric igniter, patented by the Westinghouse Machine Company. It differs from all others in the respect that it is duplex, and the bonnet covers two separate mechanisms. This construction makes it possible to change the connections of the wire from the battery to either set of terminals while the engine is running. If desired, both sets of terminals can be used at one time; thus ensuring absolute certainty of ignition. This is often done in large electric station work. All charges being proportioned to the load, if the latter is suddenly thrown off, there is one heavy charge already locked in, which cannot be removed, although the governor acts instantly; and there may be another under way which may be partially reduced by the action of the governor. This tends to speed up the engine a trifle above the normal; but because of the fly-wheels this tendency is so slight that it can be ignored in practice.

I will now dwell upon the gas consumption; and what I say in this respect is applicable only to the Westinghouse gas-engine. The gas consumption in all engines varies with the kind of gas used and also with the size of the engine up to certain limits. The average performance of the Westinghouse gas-engine—say, from 20-horse power upwards—is 10·5 to 12 cubic feet of natural gas per brake horse-power-hour. According to numerous tests with the Junkers calorimeter, I have found that the average heat-value of natural gas is 1000 British thermal units per cubic foot. That is, the engine requires 10,500 to 12,000 British thermal units for each brake horse-power-hour, giving a heat efficiency

at the shaft of 25·4 per cent. and 21·3 per cent. respectively. These are not fancy figures, but represent the every-day performance of the engines while in the hands of the customer. Some special Westinghouse gas-engines have been built which have given much better results than those above mentioned; and I have in mind a special 125 brake horse power gas-engine which when tested gave the phenomenal economy of 9 cubic feet per brake horse power. This would give an efficiency at the shaft of 28·7 per cent.

These are good results; but they are not so good as may be expected, and I firmly believe that the every-day performance of a gas-engine will within a short time reach 33⅓ per cent. Some experiments are being made along this line now, and with reasonable show of success. In comparison with this result, I quote the gas consumption of the Lenoir engine of 1861, which was practically 90 cubic feet of about 700 heat unit gas per brake horse-power-hour. The engine was really the first commercial gas-engine offered to the public. The next step was the Otto-Langen free-piston engine, which in reality was the invention of Barsanti and Matteucci, brought out in or about 1867. According to Tresca, the gas consumption per brake horse power was 44 cubic feet per hour. In 1876, Otto brought out the so-called "Otto silent" gas-engine. This engine was a compression engine, and in principle not very different from the "hit-and-miss" engine of to-day. This cycle is called the "Beau de Rochas" or the "Otto," although Gustav Schmidt is probably the originator of it. The consumption of gas was about 30 cubic feet per brake horse power per hour. Thus we can see the efficiency of gas-engines as cited above in the case of the Westinghouse engine has been notably improved.

It is necessary in a gas-engine to have the cylinders and all the parts exposed to the heated gases water-cooled, in order to prevent over-heating of the different parts. This is generally done by letting a stream of water flow through the cylinder jackets. As the public at large seem to be ignorant as to the water consumed per brake horse-power-hour, I shall here state the amount required. In winter the consumption may be put down at about 30 lbs., and in summer 38 lbs. to 40 lbs. per brake horse power. In places where water is expensive, this need not be wasted, as by putting up a tank or tanks according to the size of the engine, the loss of water need not be more than a few gallons per week, or just as much as the evaporation of water from the surfaces of the tanks would amount to. Another way of cooling is by means of a tower. The water is pumped from a well through the water jackets of the gas-engine cylinder, where it becomes heated, and from there over the top of a cooling-tower, to again return to the well at about atmospheric temperature, to be used over and over again. This mode of cooling produces a greater loss of water than with the tank system; but it is almost always used in connection with large-sized engines. Not long ago I made some tests for the purpose of ascertaining the amount of water necessary for cooling, and to determine the heat lost through the same. It was found that there went out in the cooling water 5121 British thermal units, and that 2922 units were converted into work; so the approximate amount of heat which went out through the exhaust and was lost by radiation must be 2957 units—making a total of 11,000 units. From this you will see that there is still room for improvement towards efficiency. The bulk of the loss is in the cooling water.

As to the future of the gas-engine, until recently the gas-engine has been made in comparatively small sizes only, and, as I have before stated, only for what you may call rough work—that is, where steadiness of speed was not essential. The largest engine in America, made commercially, was only 100-horse power, having two cylinders, and of the "hit-and-miss" type. The public looked upon the gas-engine as a sort of "freak," and did not take very kindly to it. The hard times, however, which we have experienced during the last five years or so have done much towards introducing the gas-engine. The keen competition and small margin of profit caused manufacturers and business men to look around for some spot where a saving could be effected in their establishments. An investigation followed which was favourable to the gas-engine. The introduction of electricity, calling for prime movers, also stimulated demand for a cheap and convenient motor; and this more than anything else has brought the gas-engine forward. I know for a fact that when Mr. Westinghouse, about five years ago, commenced experiments with the gas-engine, he did so because he foresaw a large future demand for it in the electrical field, providing it could be made to give the service that its brother, the steam-engine, was doing. Experiments on a fairly large scale followed, both on compound and single-expansion engines. The work was hard and trying, as the obstacles to overcome were numerous; but the results have been gratifying. In the early part of the spring of 1898, a engine of about 650 brake horse power was completed in the works of the Westinghouse Machine Company. This engine is of the three-cylinder type, and has a speed of 150 revolutions per minute. After it was thoroughly tried on the testing foundation, it was erected in the power-house of the Westinghouse Electric and Manufacturing Company, where it is running in regular commercial service of a severe character. The engine is connected directly to a suitable electric generator, and runs in conjunction with one or two steam-engines, according to the call on these units for electric current. This is by far the largest gas-engine in the world; but it will not long enjoy the distinction. The Westinghouse Machine Company are now making drawings and patterns for a 1500 brake horse power gas-engine, also of the three-cylinder type, and designed to run at 100 revolutions per minute. Remarkable economy is expected from this engine, as every possible care is being taken to make it a model of modern gas-engine construction. It would not be surprising if it develops a brake horse power for every 8½ cubic feet of natural gas consumed per hour, or 8500 British thermal units per brake horse-power-hour. This would give a heat efficiency of 30 per cent. at the shaft. When gas-engines can be made of such efficiency in large units, they will undoubtedly compete successfully with the most modern steam-engine. A gas-engine of such size and efficiency will run day in and day out on less than 1 lb. of coal, burned in a good producer-gas plant, per brake horse-power-hour. This includes the banking of fires and similar losses. It would have to be a high-grade steam-engine and boiler plant if it should regularly be able to produce a brake horse power for 2 lbs. of coal per brake horse-power-hour—twice the amount of fuel required by the gas-engine under similar conditions.

From the foregoing, you will see that the gas-engine is no longer limited to special power purposes. It can hold its own as a prime mover, and can be used for almost all purposes for which the steam-engine can be employed. But all this has not been accomplished in a day. It is now 108 years since the first patent for an explosive motor was taken out by John Barber; and from that time onwards it may be seen that great improvements have been made.

THE PURIFICATION OF PUBLIC WATER SUPPLIES.

At a recent Meeting of the Civil and Mechanical Engineers' Society, an interesting paper on the above subject was read by Mr. W. N. Twelvetrees, and was illustrated by a large number of diagrams, some of which were exhibited by permission of the Institution of Mechanical Engineers and of Mr. P. H. Palmer, the Borough Engineer of Hastings.

Before proceeding to describe in detail the construction of mechanical and other filters, and of plant in which physical and chemical agencies are employed for water purification, Mr. Twelvetrees directed attention to the physical characteristics of water derived from various sources, and mentioned the problems always presented when river water is used for the supply of water-works.

Filtering media of various kinds were next considered, and the conclusions arrived at, after exhaustive tests, by Dr. Sims Woodhead, Dr. Cartwright Wood, Dr. Netter, of Paris, and others, were quoted. The result of the investigations in question bears out the statement that, in a general way, the public safety depends largely upon the watchful care of water engineers and of other scientific officials, and in a lesser degree upon the intrinsic merits of any given filtering medium.

After dealing with the question of natural and artificial purification, by percolation and by deposition, the author demonstrated, by the aid of sectional drawings, the actual nature of the process taking place in sand filtration beds. He pointed out that sand in itself does not present any special recommendation as a filtering medium. The efficiency of a sand filter does not become established until a gelatinous layer, formed of mud, algæ, and micro-organisms, has been formed upon the surface.

Incidental reference was made to Hunter's sand-washer, the construction and working of which was made clear by a series of diagrams illustrating the application of the apparatus in the Leicester Corporation Water-Works, at Swithland. Another type of sand-washer, invented by Mr. A. T. Walker, the Water Engineer to the Reading Corporation, was also described.

Leaving ordinary sand filtration, Mr. Twelvetrees proceeded to discuss some modified methods which have been adopted with great success. One of these is known as the Morison-Jewell process, of which the distinctive feature consists in the substitution of a clean film of gelatinous aluminium hydrate for the casually accumulated layer constituting the chief purifying medium in ordinary filter-beds. Another modified mode of sand filtration is one in which polarite, alone or mixed with sand, takes the place of one of the strata of sand. Polarite is the name given to a specially prepared and porous form of magnetic oxide of iron. Water passes freely through as well as around the granules of this substance, within the pores of which polarized oxygen is contained, and which, upon contact with suspended or dissolved substances, produces oxidation. This action is not carried on at the expense of the material itself; as polarite, being absolutely rustless, is practically everlasting. Fresh supplies of oxygen are, of course, necessary, and periodical washing is also required. Some interesting diagrams were shown of polarite filters as used at the Hastings and Reading Corporation Water-Works.

Methods of purification for hot and cold climates, where sand filtration is often impracticable, were next discussed and illustrated. Many forms of apparatus coming under this category show considerable mechanical ingenuity, and installations upon a large scale are noteworthy for the magnitude of their output as compared with the limited space required. Among filters of this kind the author specially mentioned the "Riddell," the "Torrent," the "Howatson," and the "Wilson." These have

all been applied for public purposes, and in installations capable of dealing with from 1,500,000 to 2,600,000 gallons of water per 24 hours.

Various ingenious contrivances for cleansing are generally used in addition to reverse currents of water. The "Riddell" filter has an arrangement of radial arms, which are moved up and down as well as in a rotary manner, by hydraulic power. In the "Torrent" filter compressed air is employed; and in the "Wilson" apparatus, a very ingenious automatic flushing system is adopted.

Mr. Twelvetrees next drew attention to the example of water-works filtration by the Pasteur method, as used at Darjeeling. The output is about 250,000 gallons daily; and as the Pasteur filtration employs the only known absolutely germ-proof medium, the installation in question may be regarded as unique.

Another mode of water purification referred to was that patented by Mr. Anderson in 1889, where, as many of our readers are aware, water is agitated in revolving drums containing fragments of metallic iron. Some of the iron is dissolved, and as the water passes from the apparatus to settling-tanks it is aërated. Oxide of iron thus formed carries down impurities by deposition.

Sterilization by heat at a temperature of 240° Fahr. affords perfect immunity from pathogenic bacteria; and an apparatus known as the Vaillard-Desmaroux heat sterilizer was described and illustrated. This form of appliance has been adopted for the water supplies of towns in Russia and in Brazil. It should always be borne in mind, however, that the extinction of germs and spores is one matter, and that the removal or oxidation of poison in solution is another and not unimportant problem.

Water softening employed for the purification of public water supplies was illustrated by a set of drawings and photographs of the Ashby-de-la-Zouch Water-Works, where the Archbutt-Deeley process, briefly described in the "JOURNAL" for Sept. 13 last year, is used with great success.

Mr. Twelvetrees, in conclusion, emphasized the desirability of regarding efficiency as the first consideration in every case, and expressed the hope that the line of defence which had been established by water engineers in the interests of the public safety might always be furnished with weapons of the most modern and scientific kind.

In opening the discussion, the President (Mr. Baines Dadley) remarked that the subject before the meeting was one of great public interest, especially at the present time, when the future water supplies of the Metropolis were receiving so much attention. It was a matter of surprise to him that the London Water Companies had allowed provincial Local Authorities to take the initiative in respect of some of the improved methods of purification to which attention had been directed by the author. As, however, several gentlemen professionally interested in the Metropolitan water supply were present, he hoped that the meeting might have an opportunity of hearing their views on the matter.

Mr. St. George Moore mentioned the satisfactory results furnished by the polarite filters designed by him for the West Hampshire Water-Works, and also described a method he had adopted for the supply of water to filter-beds in the form of a spray or fine rain. By pulverization in this way, the particles of water not only come into contact with oxygen in the air, but carry down with them large quantities of air into the filter-beds, thus renewing and revivifying the polarite of which they are made. Mr. Moore also spoke of the Walker sand-washer, which had given satisfaction at the West Hampshire Water-Works.

Mr. C. E. Cassal, speaking as a scientific chemist, said the germ layer in sand filters might possibly constitute an element of danger. He described sand filters as being largely chemical in their action, and polarite filters as possessing this characteristic in larger measure. Reports on London water usually show the quality to be excellent; but Mr. Cassal pointed out that the removal of suspended matter, to which such reports chiefly refer, is not a sufficient guarantee of safety. He said it had been proved that water, though leaving the works in what was usually considered to be good condition, still permitted the growth of organisms; and the blowing out of dead ends on water-mains afforded striking evidence on this point. Referring to the bacteriological examination of water, the speaker said that decisions should never be influenced by negative evidence; and in support of this statement he mentioned the fact that neither at Maidstone nor at King's Lynn had bacteriologists been able to detect in the water any germs of the disease responsible for the recent epidemics in these towns. The danger attending filtration is that unless frequent and careful examination is made, insufficient purification results. Filtered water should always be of a quality to stand the test of the chemical and other examinations necessary.

Other gentlemen took part in the discussion; and the meeting terminated with a vote of thanks to the author.

The Acidity of Moorland Waters.—Some researches on the acidity of Moorland waters have lately been communicated to the Chemical Society by Mr. Ackroyd. Comparisons are made proving that the differences in acidity of waters from various gathering-grounds are due to differences of gradient. It is finally shown that the organic acid in solution is of lower equivalent than that of the lowest humic acid known.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Proposed Increased Prices of Welsbach Burners.

SIR,—The comments you make upon the circular issued by the Welsbach Company in the last number of the "JOURNAL" will be read with considerable interest. The fact that the Company's business is demanding an extension of agents is in itself a most satisfactory feature for gas undertakings generally. It has long been apparent that it would be necessary to increase the facilities for obtaining the mantles. With the present exclusive agent system, many consumers have preferred to let the Welsbach burner remain unused when the mantle was destroyed, rather than send some considerable distance to the special agents of the Company. Had it been possible to send out to any ironmonger or other local agent, the burner could have been at once made good. Whatever may be the views of the respective agents, the advantages to the consumers by the present announcement will be very great.

The astounding feature in the announcement you make is the large increased prices proposed by the Company, which will undoubtedly meet with very considerable dissatisfaction. It has long been hoped that a reduction in the present prices, and more particularly as regards mantles, would be forthcoming. Such reduction would be bound to increase the business of the Company to a large extent. The present price of mantles, as is often pointed out, is excessive—due, of course, to the patent rights. Even in this matter there should be some respect paid to the commercial value of the article itself, which must be insignificant. Instead, however, of the contemplated reduction gas suppliers have been anxiously awaiting, we are met, on the other hand, with an alarming increase. Such a retrograde step by the Company will undoubtedly have prejudicial effects upon their interests.

The high-handed methods adopted by the Company in the past seem to preclude the hope that their burners will become universally adopted, unless forsooth they can adapt themselves to present-day requirements. At all events, increased prices are in the wrong direction.

Huddersfield, March 29, 1899. EDWARD A. HARMAN.

Tar for Boiler Firing.

SIR,—I should be glad if any of your readers could give me particulars of any successful system of burning tar in Lancashire boilers. In the manufacturing concern with which I am connected, we have to sell our tar at 2d. per gallon; and our boiler coal costs us 12s. to 13s. per ton in the yard. How many gallons of tar will equal a ton of coal? Our gas plant is very crude, and the tar I believe to be very "rich."

March 27, 1899. IRELAND.

The Jasper Incandescent Gas-Mantle.

SIR,—In the article on the subject of the Jasper incandescent gas-mantle which appeared in the "JOURNAL" for the 14th of March there is a statement that "in Germany its excellent qualities have created for it a very large demand." Having been in the incandescent mantle trade for the last five years, I know a little about what is going on in that line; and I have heard of Mr. Jasper's mantles, and tested one or two. I am not sufficiently conceited to publish my opinion on its qualities; but as regards the "large demand" in Germany, I think the writer of the article must have been misled. So far, these mantles have entirely failed to produce any impression on the market here; and the universal opinion in trade circles is that the appliance is, and will remain, a stillborn child.

Berlin, March 27, 1899. EDWARD MARCUS (Oberfelt and Co.).

We have received from the Secretary of the Welsbach Company (Mr. George A. Gutch) a letter referring to the following statement in the article above alluded to: "From the same source, we learn that the Paris Welsbach Company have been experimenting with it [the mantle], and, so satisfied are they, that at the present time Herr Jasper is in Paris negotiating the sale to them of his patents for France." Mr. Gutch says: I sent a copy of the "JOURNAL" to the French Welsbach Company, and asked them whether the statement above quoted was true, and, if so, what were the results of their experiments with the Jasper mantle. I have since received a letter from them in which they state as follows: "We are much surprised to read in the 'JOURNAL' that our Company was negotiating the purchase of the Jasper patent for France after having made experiments which had given complete satisfaction." They go on to say: "It was only a month ago that we even heard of the existence of such a patent, which was brought to our notice by a gentleman with whom we were in business relations in Paris." As the specification gave them no definite idea as to the value of the patents, it was proposed that they should have some mantles with which to experiment. They go on to say as follows: "It was not until the 15th of March—*i.e.*, the day following the date of the issue of the 'JOURNAL OF GAS LIGHTING'—that Mr. Jasper came from London to make experiments of his process at our offices. These experiments, which were carried out with only two or three mantles, were insufficient to demonstrate to us the method of preparation. . . . We have not, therefore, been able to form any opinion as to the merits and advantages of the Jasper process; but, such as they are, we are of opinion that they would not justify the claims Mr. Jasper has advanced. You see, therefore, that at the present time matters are far from being at the point indicated by the 'JOURNAL OF GAS LIGHTING.'"

[With reference to the statements alluded to in the foregoing communications, it is distinctly pointed out in the opening paragraph of the article in question that they were made on information received, and the expression is used "if the information is correct."—ED. J.G.L.]

Clevedon Gas Company.—The ordinary meeting of this Company was held yesterday week. The accounts presented showed a balance of £1553, which enabled the Directors to recommend a dividend of 6 per cent. on the "A" and "B" shares, and 5 per cent. on the "C" shares, the transference of £215 to the reserve and depreciation account, and the carrying forward of £249. The report was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

On Monday last week, the Airdrie and Coatbridge Water Bill, the Bristol Gas Bill, the Herne Bay Water Bill, the Lea Bridge District Gas Bill, the Walton-on-Thames and Weybridge Gas Bill, and the Yeadon and Guiseley Gas Bill were read the third time, passed, and sent to the Commons; and the House adjourned till the 17th inst.

HOUSE OF COMMONS.

On Monday last week, the Airdrie and Coatbridge Water Bill, the Bristol Gas Bill, the Coalville Urban District Gas Bill, the Herne Bay Water Bill, the Lea Bridge District Gas Bill, the Perth Water, Police, and Gas Bill, the Walton-on-Thames and Weybridge Gas Bill, and the Yeadon and Guiseley Gas Bill, brought from the Lords, were read the first time, and referred to the Examiners; the Metropolitan Water Companies [Government] Bill was reported, with amendments; and the Stockport District Water Bill was read the third time, and passed. On the following day, the House adjourned till the 10th inst.

HOUSE OF COMMONS COMMITTEE.

(*Before the Right Hon.* HENRY CHAPLIN, *Chairman*, *Mr.* C. A. CRIPPS, *Mr.* LEES KNOWLES, *and Mr.* OLROYD.)

METROPOLITAN WATER COMPANIES (GOVERNMENT) BILL.

This Bill, which, it will be remembered, was introduced by the Government to "enable and require the Metropolitan Water Companies to supply each other with water in cases of emergency," came under consideration by the above-named Committee to-day.

The Hon. J. D. FITZGERALD, Q.C., and Mr. A. G. RICKARDS appeared for the Local Government Board in support of the Bill; Mr. BALFOUR BROWNE, Q.C., Mr. WORSLEY TAYLOR, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Mr. POPE, Q.C., Mr. LITTLER, Q.C., Mr. PEMBER, Q.C., and Mr. BAGGALLAY, Q.C., for the Associated Water Companies; Mr. H. A. RIGG, for the Corporation of the City of London; and Lord R. CECIL, for the County Council of Hertfordshire.

Mr. Fitzgerald, in opening, said this was a Bill to give effect to the first report of the Royal Commission (now sitting) on the Metropolitan Water Supply; and its object was to enable and require the Metropolitan Water Companies to supply each other with water in cases of emergency, and so prevent the recurrence of what happened last year, when for a considerable period there was a curtailment in the district of the East London Company of a full supply of water, with much resultant inconvenience and distress. At this time, the other Water Companies were in possession of surplus supplies; and had these supplies been immediately available, there need not have been any interruption. At a later date, very considerable assistance was given to the East London Company—first by the New River Company, and then by the Southwark and Vauxhall Company. This was not a Bill in any sense enabling or compelling the Companies to obtain new sources, but merely to require them to utilize their existing sources, in case of any other Company being for the moment short. The whole matter had been considered by the Royal Commission; and he proceeded to refer in detail to their report on the subject, the basis of which, practically, was the proposals of the Companies. The Bill carried out substantially all the recommendations of the Commissioners, with the exception of the appointment of the standing arbitrator; and this it had not been thought necessary to encumber the Bill with, because the appointment could be made by agreement or, failing agreement, by the Local Government Board. Counsel was proceeding to refer in detail to the petition of the Associated Water Companies when,

The Chairman remarked that the petition appeared to be against particular clauses. He did not think it was necessary to go into this at the present time.

Mr. Fitzgerald said in that case he would turn to the only petition against the preamble—that of the London County Council. The Council understood, they said, that the Bill had been proposed as a temporary measure of protection against deficiencies in particular districts, and not as a measure affecting more important questions pending between the Council and the Companies with respect to the transfer of the undertakings to a public authority. If the Bill were passed in its present form, it would confer powers which, unless the purchase of the undertakings were completed within seven years, would materially alter the position of the Companies in relation to Parliament and the public. This, Counsel held, was merely a question of a particular clause. The Council went on to contend that the effect of the Bill would be to withdraw from the direct control of Parliament and relegate to the decision of a department all those important questions with respect to the extension of the Companies' works and capital powers regarding which they had hitherto been subject to Parliament. They did not object to power being given to the Local Government Board to secure and enforce the fulfilment of statutory obligations; but they did object to provisions which might have the effect of enabling the Companies to escape from their present statutory control and obligations. As to this, Counsel asserted that there was no such provision in the Bill. The Council proceeded to point out that they had applied to Parliament for power to purchase the undertakings of the eight Companies. This, however, was raising the question of purchase by the London County Council, which had nothing whatever to do with the Bill.

The Chairman intimated that this was the view of the Committee.

Mr. Fitzgerald (continuing) said the Council further held that unless the Companies' undertakings were purchased within seven years—the period fixed by the Bill—the scheme appeared to involve a new concession to the Companies by placing them upon a fresh footing in regard to the supply of water. They submitted, therefore, as reasonable and expedient in the interests of the public, that the existing relations between the Companies and the consumers should be revised; and that in place of the Companies being permitted to continue to rely on existing sources, they should be required to provide for future requirements by establishing works to bring in water from new sources. This, again, had nothing to do with the Bill. The Council next referred to the issue of debenture stock (which was a mere clause question), and strongly objected to the proposal of clause 2 to set aside the enactments of Parliament with respect to the provision of a sinking fund as against capital expenditure. In conclusion, they said no sufficient justification for the powers sought could be shown to exist. Counsel said he did not propose to call evidence—the evidence for the Bill being the report of the Royal Commission—but would leave the preamble, or what in a Bill of this kind would be called the principle, to be dealt with at once on the report of the Royal Commission.

Mr. Worsley Taylor remarked that the course adopted took him by surprise, as, the Bill having been opened in the ordinary way, he thought it would have been proceeded with in the ordinary way, and that the County Council would have an opportunity of eliciting certain facts from the witnesses. He thought the most convenient course under the circumstances would be to call evidence.

Mr. W. H. Dickinson, Chairman of the Water Committee of the London County Council, said his Committee had always understood that the Bill was intended to have no permanent effect upon the relationship between the Water Companies and the public. Apart altogether from the question of purchase, there was the question of future amalgamation and control, if no purchase intervened. If the Royal Commission reported against purchase, the very next thing would be that Parliament would be asked to act on the recommendations of the Commission with regard to some system of control. Therefore the Council felt it to be very important that no action should be taken at present which should at all stereotype a new position of affairs as between the Companies and the consumers, whether there was purchase or not. In the event of purchase, the Bill would protect London; but the Council regarded it from the point of view of there being no purchase. In this case, the Bill would have a very important permanent effect. It should be made quite clear that, if the Bill was to proceed, it was not to have any permanent effect, and that it would not prejudice the position if the County Council had to ask Parliament subsequently to deal with the whole question. If there were no purchase, there would undoubtedly arise questions as to amalgamation, and about the rights to charge at different rates, which would certainly be affected by the Bill, if it became law. It would materially alter the position of such a Company as the East London, by preventing them from relying entirely on their own resources. If this Company were insured against famine, their position would be far better than it was before.

Mr. Cripps: Of course, you are at one—all public authorities would be—as regards preventing a famine?—Yes.

How do you say this Bill affects the question of control—for instance, the right of charging at different rates?—Supposing we were now considering what would be the future position of the East London Company, in order to enable them to fulfil their obligations, we can show that during the last famine the Company were supplying during two hours a day 237,000 people who had a right otherwise to call upon the New River Company to supply; and had these people been in a position to call on the New River Company, they would have had water all day long, and at £11,000 less than for the water which they did not get. The same question might arise in connection with almost every Company in London. It has been proved before the Royal Commission that the arrangements the Water Companies have now made, providing they are legal, are quite sufficient to protect the East London Company against famine; and one of the great difficulties in regard to the Bill is that, though it was understood that an expenditure of £64,000 would place them in security, they are now proposing, subject to the sanction of the Local Government Board, to lay out a very much larger sum.

Further examined by Mr. Worsley Taylor: There being no limit in the Bill, there ought to be one fixed for its duration, so as to secure its being a temporary arrangement. The clause enabling the Companies to exercise the same powers outside as they exercised within their districts, as regarded works, should be limited. The general objection to the Bill was that it departed from the principle that had prevailed hitherto that the Companies had for all purposes been restricted to their own districts. This was a very important matter—especially with regard to the sale of water and to the laying of pipes. It was a step towards a system of amalgamation, which might be right or wrong, but which the Council thought ought to be accompanied by much more consideration than naturally could be given in the present circumstances. The Bill, he pointed out, would enable the Companies to put in force, with the consent of the Local Government Board, some such plan as was suggested before the Royal Commission, and not approved—viz., to establish a scheme at a cost of half-a-million for inter-insurance. In view of what passed as to the proposal to spend £64,000, it was not necessary, he held, to give this power.

Mr. Worsley Taylor: Is it, in your view, necessary to make this entire change in the method of raising money?—The proposal to exempt the money raised for these purposes from the operation of the sinking fund is one to which the Council attach the very greatest importance.

In the first place, it takes the power of raising money from the control of Parliament, and hands it over for the first time to the Local Government Board?—That is what I was going to say.

Are you aware that the Companies could raise, under the operation of their existing statutes, this sum of £64,000?—Yes.

Mr. Cripps: Do I understand you to suggest that the Royal Commission limited their recommendation to £64,000?—I submit that if the report is read through, the only scheme that commended itself to the Commission was the last.

Further examined: If the Companies were authorized to apply unexercised capital powers to these works, the method of raising this capital would be governed by the existing Acts for the operation of the sinking fund. It was very important as to how the sinking fund was to be dealt with. The Companies were every year attempting to delay the operation of the sinking fund; but the County Council had—with considerable difficulty, he agreed—always persuaded Committees to maintain it, and never allowed the Companies' argument as to differentiating between one class of capital and another. At present every penny of capital authorized in recent years was under the sinking fund clauses. The proposal of the Bill would be a departure from a principle which, after severe contests, the Council had carried through various Committees of

both Houses; and they certainly thought a change like this should only take place when the whole matter was under review.

Mr. Worsley Taylor, in reply to a suggestion from the Committee that witness was dealing with questions which would properly arise on clauses, said the position of the Council was that they were prepared to show that the Bill was not necessary, but that they could not ignore the recommendation of the Royal Commission. It was put that the Bill was to be purely temporary; and provided this was made perfectly clear, much of their opposition would be disposed of. But they would oppose the preamble, except on condition that the modifications now being suggested were inserted.

Mr. Pope said this course entailed a second discussion of those matters if the preamble were passed, which would be very inconvenient.

Argument followed as to the course to be pursued, in which it was suggested by Mr. Fitzgerald that the points being put to witness were really points of argument, not evidence, and that Counsel could deal with them as observations addressed to the Committee. An intimation was also made from the Committee in agreement with this view; and Mr. Worsley Taylor thereupon said he would act on it. He then asked the indulgence of the Committee for a few minutes, while consulting with his advisers as to the course to be pursued. As a result of the consultation, Mr. Balfour Browne announced that this was all the evidence they proposed to tender on behalf of the Council; and Mr. Dickinson accordingly left the chair.

Mr. Worsley Taylor, in summing up the case for the Council, said that, though they bowed to the decision of the Royal Commission as given in their interim report, the Council did not consider that the Bill was necessary. The whole difficulty had arisen in the district of one Company; and this limited difficulty had now, under existing powers, been dealt with sufficiently to prevent any recurrence of a water famine. A question to which the Council attached the greatest possible importance was raised by clause 2 of the Bill. This enabled the Companies, with the consent of the Local Government Board, to raise the money required for the purposes of the Bill. It was an absolute departure from anything Parliament had yet done in the whole history of the Water Companies. Whenever they required to raise further money, the Companies had hitherto, every one of them, been obliged to come to Parliament, and to prove to Parliament the necessity for raising it—thus giving Local Authorities and others interested the right to go before a Committee and state their case. Now, for the first time, this parliamentary right was taken away, and handed over to the Local Government Board, who had never had to deal with such a matter before. The Council thought that Parliament ought to preserve its rights to deal with this matter in the interests of the consumers and others. There was no necessity for making this departure. Substantially the whole question at issue was an amount of £64,000; and it was a strong thing to upset the whole course of parliamentary procedure for the sake of such a comparatively small sum. The necessity for the Bill had arisen because one Company were in default; and yet, by clause 2 of the Bill, with its proviso exempting this money from the operation of the sinking fund clauses, they were proposing to reward the Company for their default by allowing the money to be raised on more favourable terms than it would have been raised had the Company fulfilled their duty in the ordinary course, when they would have had to raise the money on terms in accordance with the ordinary parliamentary practice. It was urged that this expenditure would not produce any profit; but it at any rate enabled the Companies to make a profit on the rest of their works. It stood on very much the same footing as the Staines reservoir scheme; it was rather by way of an insurance for the Companies concerned.

The Chairman: The Committee have come to the decision at this stage of the proceedings to pass the preamble of the Bill; but there is this difficulty in the case—that there is no preamble. Therefore the decision will be to proceed with the Bill.

Mr. Cripps: That, I think, leaves all Mr. Worsley Taylor's points open. There is no decision on them at all.

Mr. Balfour Browne: We have put forward all the points we think can assist the Committee; and under the circumstances we do not propose to take any further part in the discussion of the Bill. If there is any point we have introduced that commends itself to the Committee, I have no doubt the Committee will introduce it; but we do not propose to discuss clauses. I dare say you know that it does prejudice one elsewhere if we do go into clauses; and therefore we leave the matter in the hands of the Committee.

Mr. Cripps: I thought the question of prejudice elsewhere had been provided against?

Mr. Balfour Browne: I dare say. On the whole, we will take no further part in the discussion of clauses.

The representatives of the London County Council then retired; and the Committee proceeded to consider the clauses.

On clause 1, Mr. Pope asked that the Companies should have power, with the consent of the Local Government Board, in the event of absolute emergency, to temporarily increase their draught from the Thames.

Mr. Cripps: Can you put that within the four corners of the Bill without further notices?

Mr. Pope: I do not know what notices are necessary in the case of a Government Bill.

Mr. Fitzgerald submitted that this power could not be inserted in the Bill, as the riparian owners and others directly interested in the question had not, and could not, have had notice of it.

The Chairman: The Committee are of that opinion.

Upon sub-section 3 (clause 1), which deals with the cost of constructing and maintaining the works under the Bill, Mr. Fitzgerald suggested a proviso putting a proportion of the cost of the works specially upon the Company taking water by means of the works.

Mr. Hollams, the Solicitor to the Associated Water Companies, was called on this point, and stated that the scheme presented to the Royal Commission was that, to guard against emergencies or accident, certain works would be constructed by the Companies jointly; and these works were intended to be limited to the scheme put before the Commission. The cost was to be borne by the Companies in proportion to their water income. This entailed very unequal burdens, because the water-rental of some Companies was vastly in excess of that of others; and it might well be that the works contemplated would be of no advantage to some of the Companies. The scheme was, however, put forward as for the general protection of the public, and to carry out a reference to the Commission; and to this limited extent the Companies agreed to bear those unequal expenses, irrespective of which Companies were benefited. But the arrangement was subject to the provision that the Company deriving benefit should contribute to the extent of not exceeding £20 a day to the common fund. This was in respect of the capital expenditure for works. The water supplied was another question altogether, and one in which the joint Companies had no interest at all. If Company A took water from Company B, Company A must pay a reasonable sum for the water supplied. This affected only the two Companies. If the works referred to in the Bill went beyond the intercommunication scheme submitted to the Commission, the provision as to sharing expense ought not to apply. The expense should be limited to such works, or other works as settled by the arbitrator. He gathered that it was contemplated to extend the works from time to time. The contribution in the Bill should be limited to intercommunication for the general protection of London. Any further works for one Company to supply another or for the special needs of one Company, should be dealt with on a different footing.

After discussion, the clause was agreed to in this form: "Provided that any Company receiving water by means of such works shall pay during the time they take such water, in addition to any other sum payable under this sub-section, such proportion of the interest on the total cost of their construction, not exceeding £20 a day, as may be agreed by all the parties, or, failing agreement, to be fixed by arbitration."

On the initiative of Mr. Fitzgerald, an amendment was then made in the first section by which the penalty for not complying with the order of the Local Government Board with reference to the matters mentioned, was altered from £100 to a sum not exceeding this amount.

On section 22, Lord R. Cecil asked for an amendment providing that none of the capital to be authorized should be applied to the sinking of new wells or the enlargement of any existing well. There was nothing to confine the application of the capital authorized to existing works.

The amendment was discussed, but was not accepted.

With regard to the provision that the stock should be raised in accordance "with the provisions contained in the most recent Acts for the time being with reference to the issue of debenture stock by a Metropolitan Water Company," it was pointed out that the most recent Act might differ from that of the particular Company raising the stock. It was eventually agreed to make the word "Acts" "Act;" the effect of which was that each Company would raise their stock in accordance with their own most recent precedent.

Clause 2 contained the proviso: "Provided that a Company shall not be required to carry to a sinking fund a percentage on the amount of money for the time being raised by the issue of debenture stock created under the powers of this Act."

Mr. Rigg moved the omission of the proviso, with the view of securing that the money be raised by debenture stock subject to the operation of the sinking fund clauses. He was instructed to press the point strongly. He gave the history of the imposition of the sinking fund clause, which, though it had been altered from time to time, had been inserted in every Bill of the Metropolitan Water Companies since 1886—even in the Staines Reservoirs Bill, though it was pointed out, in that case, that the works would not add to the Company's income at all.

Mr. Cripps: Do you argue that the Royal Commission came to a wrong decision on this point?

Mr. Rigg: That is giving it very strongly; but I am prepared to say the Royal Commission did not quite understand the operation of the sinking fund clause, and I think the Royal Commission did not quite grasp the fact that they were interrupting the continuity of legislation. He further suggested that the Royal Commission in recommending on the point had gone slightly outside their reference.

The Chairman, after private deliberation with his colleagues, said the Committee had decided to keep the proviso in the Bill.

Lord R. Cecil, on section 4, which empowered the Local Government Board to direct inspectors to hold inquiries for the purposes of the Act, brought forward an amendment giving a right to County Councils to be heard at such inquiries. He admitted that the inspectors usually heard anyone desiring to be heard; but he wanted County Councils to have the absolute right to be heard. In case of a proposal to take an emergency supply from the Lea or wells in the Lea Valley, it might be of vital importance to the county of Hertfordshire.

Mr. Fitzgerald objected. The inquiries were always open; and the mention of County Councils would suggest possibly that only County Councils were to be heard.

The Committee rejected the amendment.

Mr. Baggallay proposed a new clause legalizing the action and expenditure of certain of the Companies since August of last year in connection with intercommunication, as if the same had been sanctioned by the Local Government Board under the present Bill.

Mr. Fitzgerald objected, on the ground that the wording was too general; and the Chairman intimating that the Committee could not accept it in its proposed form, it was not pressed.

Some minor amendments having been made, the Bill, as amended, was ordered to be reported to the House.

Long Eaton Gas Company.—At the recent meeting of this Company, the Directors reported that the sale of gas had largely increased during the past year. The price was reduced from 3s. to 2s. 9d. per 1000 cubic feet from Jan. 1, 1898; and the reduction had fostered and created greater consumption. The quantity of gas made during the twelve months showed an increase of more than 13½ per cent. on 1897. The use of gas for purposes other than lighting continued to increase; and the Company had again fixed a large number of prepayment meters which were proving most popular and were giving every satisfaction. In common with other gas companies, the Directors had to face increases in the price of coal; but they had been able to get higher rates for coke. The contract for the sale of residuals had also been made on better terms. The whole of the works had been kept in good order and repair. In September last the usual interim dividends were paid; and the Directors recommended others of 6s. per share on the "A" shares and 4s. per share on the "B" shares—making 10s. and 7s. per share respectively (free of income-tax). They also advised the shareholders to write off the balance of depreciation on the old works (£324 18s.), £100 for depreciation on meters, and to carry forward the balance. The report was adopted.

LEGAL INTELLIGENCE.

Winding Up of the Compressed Gas Company, Limited.

A petition for the winding up of the above-named Company came before Mr. Justice Wright last Wednesday, in the Chancery Division of the High Court of Justice. Mr. Micklem said he represented the petitioner, who was an unsecured creditor. Mr. Sells said he appeared for the Company, and did not oppose. His Lordship thereupon made the usual winding-up order; no further particulars being stated.

Defrauding the Harrogate Gas Company.

At the Harrogate Borough Court a few days since, Arthur W. Suttell, a labourer, was charged by the Harrogate Gas Company with stealing, between Dec. 30, 1898, and the 11th ult. 1899 cubic feet of gas, valued at 5s. 1d. Mr. F. R. Paull prosecuted on behalf of the Company. He called John Hutchinson, groom to the Company, who said he for some time lodged with the defendant, who was then employed by the Company as a fitter's labourer. Defendant had a gas-cooker, a one-light pendant, one light in the sitting-room, a bracket in two bedrooms, and a small gas-fire in one of them. On Saturday, Dec. 31, defendant went away for the week-end, and witness and another lodger were left in the house. Witness asked a friend to stay with them. He did so, and they burned gas for cooking and lighting. He went into the cellar and saw the meter was disconnected; and he asked the defendant, when he came back, what the meter was doing in that condition. Defendant replied that the index-glass was broken, and he had disconnected it for repairs. The next morning it was connected up again. Between the 26th of February and the 11th of March he saw the meter disconnected, and gas used. Mr. H. Wilkinson, the Secretary and General Manager of the Company, said that on the 11th of March he visited the defendant's house, and found the meter disconnected. He had reckoned the value of the gas consumed —1899 cubic feet—at 5s. 1d. The estimated consumption of gas used by the defendant per day, between the 3rd of October and the 4th of January, was 138 cubic feet, and between the latter date and the 11th of March, 65 cubic feet per day; showing a total deficiency of between 4000 and 5000 cubic feet. Mr. Laycock pleaded guilty on behalf of the defendant, and said the case was unanswerable. In asking the Bench to deal leniently with the offence, he pointed out that the accused had been more than five years with the Gas Company, and had been of irreproachable character. The defendant had expressed extreme sorrow for what he had done. The Bench having consulted in private, the Mayor (Dr. Solly) said that, considering the Company did not press the charge, and also having regard to the defendant's wife and family, they had decided to deal very leniently with the case. They considered it as disgraceful to defraud a company as an individual; and the defendant would be fined £2 and costs, or a month's imprisonment.

Is Electricity an "Article" under the Factory Act?

The Stipendiary Magistrate at Bilston Police Court (Mr. N. C. A. Neville) has, after deliberation, given an answer to the above question, which was raised in connection with the case in which the District Council were summoned for failing to post an abstract of the Factory Act, in the Market Hall on Dec. 14 last (see *ante*, p. 522). At the first hearing, the Factory Inspector (Mr. Jackson) contended that the Market Hall was a factory because electricity was manufactured by way of trade for the purpose of gain. For the defence Mr. J. D. Wassell (Clerk to the District Council) argued that the building could not be a factory, because electricity was not an article as defined by the Act. Mr. Neville, in delivering judgment, said at first he thought it somewhat curious to call electricity an article. He recognized it as a power and a force, but to designate it an article seemed to him rather a stretch. Since then he had looked up the matter more particularly. The dictionary interpretation of an article was a particular commodity and substance, and a commodity was said to be something useful and advantageous to man. Electricity was something useful, and capable of being advantageous, and sometimes disadvantageous, to man. Electricity was made at the works admittedly by mechanical power, and manual labour was also exercised there. Therefore it would come within the meaning of the Factory and Workshop Act. The mere fact that electricity was something which was manufactured by mechanical power, in a place similar to a factory, was almost enough to make it an article under the meaning of the Act, because without doubt the object of the Act was to enclose everything it possibly could under its provisions. Electricity was similar to a great many other things. It could be manufactured, stored, moved about, and converted to different uses, and it could be stolen. This description could certainly be applied to other articles; and he thought it right to say that electricity came within the meaning of the Act as a manufactured article. The question then remained as to whether it was created, generated, or used for the purpose of gain. It did not appear to him that there was any special rate of charge for stall-holders; but the District Council had the ownership of the Market Hall, and of course were anxious to let their stalls, and it was clearly to the advantage of stall-holders to have light supplied for them rather than have to pay for it—as when gas was supplied by the Gas Company. The District Council got the benefit of it; and he thought it must be said to be a gain within the meaning of the Act. He saw no reason why the works could not come within the Factory and Workshop Act. It was admitted that an abstract of the Act had not been affixed to the premises, and there must be a penalty. Mr. Jackson said he was instructed not to ask for a heavy penalty; and Mr. Neville fined the Council 2s. 6d. and costs.

The Councillors' Bond Question at Bangor.—At a recent meeting of the Lighting Committee of the Bangor Corporation, it was decided to recommend the Council to allow the bond given by certain members, guaranteeing the city against any loss on account of the introduction of the electric lighting scheme, to which reference has already been made on several occasions, to be withdrawn, on condition that it is given up to the Town Clerk. The position of affairs is exciting much local interest.

MISCELLANEOUS NEWS.

GERMAN CONTINENTAL GAS COMPANY.

Report and Accounts for 1898.

We have received a copy of the annual report and balance-sheet submitted on the 24th ult. to the general meeting of the above-named Company, of which Herr W. von Oechelhaeuser is the General Manager. We abstract from it the following particulars.

The year 1898 was distinguished by the prevalence of good trade throughout Germany; and the gas industry benefited thereby. Allowing for the loss to the Company arising from the cession in September last of the Lemberg Gas-Works to the Municipality, the increase in the production of gas was no less than 8·23 per cent. on that of 1897; while the preceding year's increase was only 6·66 per cent. The increase in production was attended by a corresponding rise in the profit realized; and the distribution of a dividend at the rate of 12½ per cent. per annum, in place of 11 per cent. as in the two preceding years, was recommended to the meeting. So high a dividend has not been paid by the Company since 1884.

The number of burners in use actually increased by 37,701, notwithstanding the loss to the Company of 20,203 burners in the town of Lemberg. In the twelve towns still served, the number of burners therefore increased by 57,904; and the total number supplied stood at 527,601 on Dec. 31 last. This phenomenal increase was due in large measure to the spread of the use of prepayment meters, of which 4652 were in operation at the close of the year, against 1473 twelve months earlier. The prepayment meters were responsible for an increase of 16,333 burners in the course of the year, which is about 80 per cent. of the number of burners which were in use in the town of Lemberg—with a population of 140,000—at the time the gas-works there passed out of the Company's hands. The prepayment meters were made at the Company's workshop at Dessau; and their introduction in all the towns was organized from that centre. The majority of the new burners fitted were on the incandescent system, the adoption of which continued to spread. New concessions and extensions of old ones were secured for the lighting of districts supplied from the Company's works at Ruhrort and Potsdam. At the Erfurt works, a water-gas plant on Dellwik's system will be brought into operation this year. The water gas will be carburetted with benzol, as the heavy import duty on petroleum products precludes their employment.

The total gas production in 1898 amounted to 50,535,967 cubic metres (1,784,778,747 cubic feet). The consumption for heating, cooking, and power purposes rose to 19·18 per cent. of the total make; while the unaccounted-for gas also rose to 4·42 per cent. The annual consumption of gas per burner fell from 3408 to 3313 cubic feet. Of gas-engines, 906, affording 4639¾-horse power, were supplied. The make of gas per ton of coal remained at the same figure as in the preceding year—viz., 10,847 cubic feet. The coke used for firing the retorts increased from 16·31 to 16·78 per cent. of the weight of coal carbonized. The Company's electric supply works at Dessau increased their output by 16·3 per cent.; while the gas-engines used in generating the current showed a slightly lower consumption per effective horse-power-hour. The report contains an obituary notice of Herr A. Buhe, formerly Chief Engineer of the Company, whose death was noticed in the "JOURNAL" for the 14th ult.

The gross profit for 1898 amounted to 3,899,677·87 marks (about £190,228), and the net profit to 3,121,425·29 marks (about £152,265). After making the customary contributions to the reserve and contingency funds, the profit suffices for the payment of a dividend at the rate of 12½ per cent. per annum, and leaves a balance of 30,133·15 marks (about £1470) to be carried forward to this year's account.

THE BIRMINGHAM GAS UNDERTAKING AND THE CITY RATES.

Alderman Clayton submitted the estimates of the Finance Committee at a Special Meeting of the Birmingham City Council last Tuesday. In connection with the improvement rate, he moved that it should be 2s. 5d. in the pound, which was an increase of 1d. Explaining the necessity for this, he pointed out, among other matters, that last year the Gas Committee contributed £30,586 from their profits; while this year they would only hand over £30,000. Mr. Lane, who took quite a pessimistic view of the financial situation, attributed the position to the fact that the Council reduced the price of gas last year. He held that, had this not been done, it would not have been necessary to put a penny on to the improvement rate. A penny per 1000 cubic feet off the price of gas meant a loss of £30,000 to the municipal revenue. This reduction was made for the purpose of catching the trade of the large users of gas for gas-engines; but the gain of the Corporation would be nothing like commensurate with the loss. The profits in the last financial year of the Gas Department were £50,000 or £60,000; this year they would only be able to provide about £30,000. Alderman Clayton, alluding to the reduction in the price of gas, suggested that this would make little difference, because possibly two-thirds of the gas profits came out of the same pockets as would have to provide for the increased improvement rate. Mr. Lane did not agree with this statement, affirming that the two classes were not identical; and Alderman Clayton did not press the point. The subject then dropped.

Newton-in-Mackerfield Gas-Works.—At the meeting of the Newton-in-Mackerfield District Council yesterday week, it was resolved to apply to the Local Government Board for sanction to the borrowing of £3050 for additional and enlarged gas-mains. The Chairman (Mr. C. B. F. Borron) stated that the rapid growth of the town had necessitated a considerable extension of the gas-works; the consumption of gas now being double what it was ten years ago, and four times what it was 23 years since. To meet the ever-increasing demand, new retorts and purifiers had been constructed at a cost of £4700.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the half year ending Dec. 31, 1898, which, with the accounts for this period, will be presented at the meeting of the proprietors on Thursday:—

The Directors submit the accounts for the half year ended Dec. 31, 1898. The revenue account shows a net profit for the half year of £52,462 8s. 10d.; making, with £116 7s. 8d., received for interest, £52,578 16s. 6d. This, added to the amount brought forward from the previous half year, makes £54,104 6s. 6d. Deducting therefrom £4563 9s. 4d., for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £49,540 17s. 2d. available for dividend. The Directors recommend that dividends be declared at the rates of 13½ per cent. per annum upon the old stock of the Company, and of 10½ per cent. per annum upon the new stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The accounts accompanying the report consist of the usual statements. They show that stock to the amount of £784,680 has been raised out of the total of £830,000 authorized; and that £235,108 has been borrowed out of £300,000 sanctioned. The receipts on capital account amount to £1,019,788 (issues of £33,930 of new stock and £34,358 of debenture stock having been made in the past half year); and there is £24,229 of premium capital—making together £1,044,017. The expenditure on capital account in the past six months (£21,146) comprised £11,648 for new and additional buildings, plant, &c., £3100 for mains and services; £2898 for meters and stoves; and £3499 for "coin" meters and fittings, less £1477 written off for depreciation. The total expenditure to Dec. 31 last amounted to £1,031,618. The reserve fund at the above-named date stood at £42,093 and the insurance fund at £28,652. The balance-sheet shows that the value of the stores in hand at the close of the half year was as follows: Coals and oil, £25,799; coke and breeze, £4389; tar, ammoniacal liquor, and sulphate of ammonia, £5146; and sundries, £16,017—making a total of £51,351. The revenue and profit and loss accounts, together with the statements relating to the manufacturing operations of the Company in the half year, are given below.

REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—			
Coals and Oil, including dues, carriage, unloading and trimming	£75,718	12	3	Common gas, per meter, at 2s. 6d. per 1000 cubic feet	£142,259	3	9
Salaries of Engineer and Officers at works	2,313	10	0	Public lighting and under contracts, common gas	10,150	11	10
Wages (carbonizing)	16,632	4	4				£152,409 15 7
Purification, including £2459 15s. 6d. for labour	5,383	19	4	Rental—			
Repair and maintenance of works and plant, materials and labour (less £158 13s. 3d. received for old materials)	19,161	0	10	Meters	£2,406	2	0
			£119,209 6 9	Stoves	1,331	9	10
Distribution of gas—				Automatic meters and fittings	2,843	2	11
Salaries and wages of Officers (including Rental Clerks)	£1,753	13	8				6,580 14 9
Repair, maintenance, and renewal of mains and service-pipes, including labour	2,449	9	10	Residual products—			
Repair and renewal of meters	1,720	0	9	Coke, less £3,647 10s. 11d. for labour	£25,906	2	11
" " stoves	1,625	5	7	Breeze, less £573 18s. 11d. for do.	954	18	3
" Automatic meters and fittings	1,477	12	7	Tar	6,231	17	5
			9,026 2 5	Ammoniacal liquor and sulphate of ammonia	5,149	16	1
Public lamps—lighting and repairing			3,044 4 6				38,242 14 8
Rents, rates, and taxes			7,438 11 5	Miscellaneous receipts—			
Management—				Rents receivable	£327	8	7
Directors' allowance	£1,250	0	0	Transfer fees	27	12	6
Company's Auditors	75	0	0				355 1 1
Salaries of Secretary, Accountant, and Clerks	1,128	17	11				
Collectors' salaries and commission	1,524	13	8				
Coin meter collection	329	15	5				
Stationery and printing	730	10	9				
General charges	417	2	7				
			5,465 0 4				
Bad debts			565 3 0				
Law and Parliamentary charges			178 0 5				
Superannuation			126 0 0				
Official Officers			73 5 5				
			£145,125 17 8				
Balance carried to net revenue account			52,462 8 10				
			£197,588 6 1				£197,588 6 1

PROFIT AND LOSS (NET REVENUE) ACCOUNT.

Interest on debenture stock	£4,563	9	4	Balance from last account	£49,189	17 6
Balance available for dividend	49,540	17	2	Less dividend for half year ended June 30, 1898	47,664	7 6
					£1,525	10 0
				Balance from revenue account	52,462	8 10
				Dividends and interest balance	116	7 8
	£54,104	6	6		£54,104	6 6

STATEMENT OF COALS.

Description of Coal.	In Store, June 30, 1898.	Received during the Half Year.	Carbonized during the Half Year.	Used and Sold in Half Year.	In Store, Dec. 31, 1898.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common coal	17,726	97,994	92,596	349	22,774
Cannel	8,754	Nil.	37*	356	8,361
	26,480	97,994	92,633	705	31,135

* 1,135,412 gallons of oil used for enrichment and oil-gas manufacture.

STATEMENT OF GAS MADE, SOLD, &c.

Quantity Made. Meter Register (partly estimated).	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Total Quantity accounted for.	Number of Public Lamps.
Thousands.	Thousands.	Thousands.	Thousands.	
1,321,550	63,555	1,141,494	1,225,150	5,668

STATEMENT OF RESIDUAL PRODUCTS.

	In Store, June 30, 1898.	Made during Half Year.	Used in the Half Year.	Sold in the Half Year.	In Store, Dec. 31, 1898.
Coke—tons	140	56,715	14,273	37,401	5,180
Breeze—tons	430	9,222	—	8,567	1,085
Tar—gallons	295,600	1,008,941	—	913,541	391,000
Ammoniacal liquor—butts	5,074	29,984	26,923	—	8,115
Sulphate of Ammonia—tons	205	754	—	839	120

SAN PAULO GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held yesterday week, at Winchester House, Old Broad Street, E.C.—Mr. D. M. Fox in the chair.

The SECRETARY (Mr. G. H. Rogers) having read the notice convening the meeting, the Directors' report and the accounts, which were summarized in the "JOURNAL" for the 21st ult., were taken as read.

The CHAIRMAN said there was not much for him to add to the very satisfactory report which the Directors submitted, and which, he was sure, the shareholders had all been glad to receive. The accounts dealt with the first year's working under the new contract; and therefore they would not be surprised to see that the Directors had made no attempt at a detailed comparison with the previous year. Such a comparison would have entailed considerable explanation, and would, he thought, have been more confusing than edifying to the shareholders. He might, however, call attention to the principal points, and, in doing so, would make use of some figures which their Consulting Engineer (Mr. A. F. Phillips) had drawn up for him. It would be noticed, in the first place, that there was a falling off in the public lighting, and an increase in the private lighting. The large reduction of £8366 in the receipts for public lighting was accounted for entirely by the price of gas having been reduced by 33 per cent. from Jan. 1, 1898, under the new contract; but the private lighting showed an increase of £3450. This was not due to the consumption of gas having been augmented, because, as a matter of fact, it had remained almost stationary; but it was owing to this, that, under the new contract, although the price was nominally reduced, it had to be paid in gold, and the Company thereby benefited in the exchange. For motives of policy, it might at some time be expedient to make a reduction in the price to private consumers; but for the present, the Directors had set their faces very rigidly against any innovations in the contract, and intended to stick to it for some time to see how it worked. They had also under the new contract increased the illuminating power, which enabled the consumers to obtain the same light by burning less gas; so that a slight decrease in the consumption was not at all surprising. The residual products had realized £253 more, which was only a small increase, but was satisfactory, considering they had carbonized 507 tons of coal less. There was a fresh item in the revenue account—meter-hire—which had brought in £1581, and was a charge they were authorized to make by the new contract. Another item was profit on exchange, £1378. This represented the differences on remittances, and was a real and substantial profit; and therefore they had included it in the accounts. Turning to the expenditure side, he said the manufacturing expenses—including coal, purification, material, and wages—were £1674 less than in 1897; but the outlay on distribution was £1757 more. This was partly owing to the renewal and relaying of mains which the Company had been obliged to carry out in consequence of the sewerage works which had been in progress in the city. When he was last in San Paulo, he witnessed the careless way in which the sewerage work was being executed; and he did not therefore at all wonder that the Company had

suffered from leakage, and had been put to this additional expense in relaying their mains. However, the attention of the Government had been called to the matter. There had also been an increase in the outlay under public lamps; and this was due to more lamplighters having been employed, and to expenses for Government inspection. The general charges were £2262 more than in 1897, which was due to special expenditure in connection with the new contract; but this would not occur again. There was also an increase of £490 in the London expenses on account of the same matter and the Articles of Association, including the generous vote which the shareholders gave him (the Chairman) last year. A sum of £2000 had also been charged against revenue for depreciation of meters. The result of the year's trading was a balance of £28,830, as against £24,825 in 1897. He thought this spoke well for their future under the new contract. To the £28,830, they had to add the balance of £1304 from 1897; and, deducting the interest on debentures, £759, they had remaining £29,375. They paid an interim dividend of 5 per cent.; and now recommended a final payment of a like amount. The Directors also proposed to add £3000 to the reserve fund, making it £40,363; and to carry forward to the current year £1375. These results were eminently satisfactory. They fully justified the Directors in having recommended the acceptance of the new contract, and showed that everything he stated at the last meeting had been fully realized. The Chairman then proceeded to deal at some length with the question of the electric light installation which the Board have contracted for. He stated that there was already a Company in existence supplying electric lighting in a small part of the business portion of San Paulo, which Company wanted them some time ago to purchase their plant; but the terms were too exorbitant. The Gas Company had since been approached by the San Paulo Railway Company, who were desirous that they should light up their new stations by electricity; and this was just the sort of little chance they required to make a start in this direction. They had, in consequence, adopted a satisfactory scheme which had been drawn up by their Engineer. He thought that the Directors had taken a wise course in regard to this matter; and their plans had been so arranged that they could, if desirable, extend the plant at any time. He regretted to say that Mr. M. Henrick, who had been their Manager for four or five years, and who conducted the negotiations for the new contract with a great deal of zeal, had, owing to the illness of his wife, resigned his position. To succeed him, they had appointed Mr. Richard Gray, who was well known in San Paulo. He had no technical knowledge of gas making; but they had an excellent Engineer in Mr. Wood, and an able staff under him. He concluded by moving the adoption of the report and accounts.

Mr. JOHN BARKER seconded the motion.

Two or three shareholders expressed their satisfaction with the greatly improved position of the Company; and, in reply to an inquiry, the Chairman stated that the cost of the electric lighting installation it was proposed to put down in the first instance would be about £25,000.

The motion was unanimously carried.

A dividend of 5 per cent. (making 10 per cent. for the year) having been declared,

The retiring Director (Mr. D. M. Fox) and the Auditors (Messrs. Cash, Stone, and Co.) were re-appointed.

The usual complimentary votes to the Chairman and Directors and the officials and staff terminated the proceedings.

PROPOSED ADVANCE OF GAS WORKERS' WAGES AT LEEDS.

A few months ago the stokers, firemen, coal and coke wheelers, coke-trimmers, yardmen, and purifiers employed at the Leeds Corporation Gas-Works made an application to the Gas Committee of the Corporation for an advance of 4d. per shift in their rate of wages; and the pipe-layers asked that their hours should be reduced from 54 to 48 per week. The stoking-machine men and elevator men employed at New Wortley works also applied for an advance of 3d. per shift in their wages; and, following the example of the men, the foremen and deputy-foremen stokers approached the Committee with a request that their wages might be increased. The Committee appointed a Sub-Committee to consider the matter; and before arriving at a decision they resolved to visit Birmingham, Sheffield, Liverpool, Oldham, Newcastle-on-Tyne, and South Shields, in order to ascertain the rates of wages and conditions of labour in these towns. Having completed their work, a meeting of the General Committee took place last Wednesday, at which this report was submitted: "That this Sub-Committee recommend to the General Committee as follows—'(1) That the stokers, firemen, and coal-wheelers be given an advance of 2d. per shift. (2) That the coke-wheelers in the inclined retort-house be given an advance of 2d. per shift. (3) That the coke-trimmers on horizontal work be given an advance of 4d. per shift. (4) That no alteration be made in the wages of the yardmen and purifiers. (5) That the application of the pipe-layers for an eight hours day be not acceded to. (6) That machine men and elevator men at New Wortley works be given an advance of 2d. per shift. (7) That the foremen and deputy-foremen stokers at the Meadow Lane and the New Wortley works be given an advance of 2s. per week; and those at York Street works 1s. per week.'" The Committee resolved to adopt the recommendations, which will come before the City Council to-morrow for confirmation. At present stokers and firemen are paid 5s. per shift of eight hours, coal-wheelers and coke-wheelers 4s., and coke-trimmers 3s. 8d. per shift, yardmen 22s. per week, and purifiers 24s. 3d. per week. Time-and-a-half is allowed for Sunday labour; so that a stoker or fireman can frequently earn 37s. 6d. a week, and with the additional 2d. per shift the amount will be 38s. 9d. The foremen stokers have 42s. per week; but they are allowed nothing extra for Sunday work, and as they have practically to be on duty every Sunday, the Committee resolved to increase their pay to 44s. at the larger works, and to 43s. at York Street works, which are not so extensive as the others. With regard to the pipe-layers, the Sub-Committee learned that in no town they had visited did men engaged in this occupation work only 48 hours per week; and they therefore could not see their way to recommend a reduction of hours. The Committee think that the advances should be satisfactory to the employees at the Leeds Gas-Works, considering the conditions of employment prevailing in the great majority of gas-works in the country.

NEW WORKS FOR THE CROMER GAS COMPANY.

It may be remembered that the above-named Company last year obtained an Act of Parliament by which, among other powers conferred, it was provided that the works should be removed from their present site to a new piece of ground at the western end of the town. This, of course, involved the design and construction of entirely new works. Plans and specifications for these having been prepared by the Company's Consulting Engineer, Mr. Percy Griffith, Assoc.M.Inst.C.E., tenders were invited; and the contract for the whole of the work was let to Messrs. Robert Dempster and Sons, Limited, of Elland, for the sum of £19,456. The work has been commenced, and it is anticipated that it will be completed and the plant in operation before the end of the year. The new site is adjacent to the Midland and Great Northern Railways, direct access to which will be secured by ample siding accommodation. The economy in working which will be effected by this means as well as by the use of Chester regenerative retort-settings and other recent improvements is expected to be sufficient to obviate any serious diminution of dividends resulting from the outlay of such a heavy capital sum. The new works will have an initial capacity of 18 million cubic feet of gas per annum; and they will be designed so that a very small additional expenditure will double the capacity, and thus secure a very low capital outlay per million cubic feet of gas sold. The general design has been carried out so as to provide for the most economical use of the land available—viz., 4 acres; and the Engineer estimates that when the land is fully occupied the capacity of the works will be at least 2 million cubic feet per day. The Engineer will be represented on the works by Mr. W. H. Archer (son of Mr. A. W. Archer, of Ponder's End), who has recently been appointed Works Manager to the Company.

The annual general meeting of shareholders was held on Monday last week, under the presidency of Mr. W. Rust. The Directors' report showed that the sale of gas for the year ending Sept. 30, 1898, had increased 13 per cent. as compared with the previous twelve months; and The sale for the quarter ending Dec. 31, 1898, had increased 14½ per cent. as compared with the corresponding period in 1897. The profit for the fifteen months amounted to £1193; and, on the recommendation of the Directors, the following dividends were declared: For the nine months ending June 30, 1898, on the "A" shares at 7½ per cent. per annum, and on the "B" shares at 7 per cent. per annum; and for the six months ending Dec. 31, 1898, on £17,000 ordinary stock, as consolidated under the Act above referred to, at 4 per cent. per annum; leaving a balance of £378 to be carried forward.

THE WATER-GAS WORKS FOR HAMBURG.

The proposal to erect water-gas works for the production of 5000 cubic metres of gas per day, and estimated to cost 600,000 marks, to which reference was made last week (p. 811), has been approved by the Hamburg Town Council; the system of production adopted being that of Messrs. Humphreys and Glasgow. In the course of the discussion which took place on the report of the Committee appointed to investigate the question, and who reported in favour of the above-named system, an effort was made by the minority, who stand as advocates of the Dellwik process, to get the recommendation referred back to the Committee for reconsideration, with an instruction to hear further expert evidence. It was pointed out that that system had been adopted at Königsberg and Charlottenburg, had been recommended for Darmstadt, and was considerably cheaper, it was claimed, both to start and keep going. In reply, Dr. Leybold, the Gas-Works Chemist, admitted that the proposed works would cost about 67,000 marks less under the Dellwik system; but, notwithstanding this, he contended that the balance of advantage rested with the Humphreys and Glasgow process. With regard to Darmstadt, it was remarked that the same authority who recommended the Dellwik system for this town had advised that of Messrs. Humphreys and Glasgow for Hamburg, as being the one which would more quickly furnish the desired supply. The amendment was rejected, and the report agreed to.

ELECTRIC LIGHTING NOTES.

It was reported at the meeting of the Crewe Town Council last Wednesday that the Local Government Board, before giving sanction to a loan of £26,000 for electric lighting purposes, had asked as to the suitability of the site, and the probable revenue from the new illuminant. It was stated that Mr. Hopkinson, the Engineer of the scheme, had declared the site suitable, and that a canvas made as to the likely revenue from consumers was satisfactory.

A Local Government Board inquiry was held at Canterbury last Tuesday regarding an application of the Corporation for power to borrow £12,000 for electric lighting purposes. In opening the proceedings, the Town Clerk asked to be allowed to increase this to £13,250, owing to the desire of the Electric Lighting Committee to include more streets in their scheme of public lighting. These sums are in addition to the original loan of £20,000. There was no opposition.

At a meeting of the Hull Electric Lighting Committee last Tuesday, the Chairman reported that loans were sanctioned during the past year amounting to £45,800 for old works, £40,690 for new works, and £26,000 for new extensions. It was very probable that the Committee would be asked to extend their mains to other districts not included in any scheme for which loans had been sanctioned; and it would be advisable at an early date to ask for powers to borrow £10,000—£5339 for the extension of mains already carried out, and the balance for similar extensions yet to be made.

A proposal to light the streets of Bude with electricity was submitted to the parish meeting at Stratton yesterday week. It was said that the Bude Electric Light Company were prepared to supply current at 4d. per unit, or an estimate of £1 5s. per lamp per annum. The cost of supplying Stratton would be much greater. Some discussion took place as to whether it was desirable to enter into arrangements with a Company who are not yet in a position to carry out a contract. In the end, it was

decided that the Parish Council should adopt electric lighting as soon as the Company can supply it. This resolution apparently only applies to Bude, for it is stated that the cost of supplying Stratton would be four times that of Bude.

At a meeting of the Walker District Council last Tuesday, the Special Committee on Electric Lighting reported that the Parliamentary Agents had written that since the Walker and Wallsend Union Gas Company (Electric Lighting) Bill was "blocked" in the House of Commons, they had ascertained from the Board of Trade that they proposed to send a memorandum with reference to the Bill to the Council, to the Lord Chairman, and to the Chairman of Ways and Means. A meeting before the Chairman of Ways and Means was arranged for Thursday, March 23, at which were present Mr. Hedderwick, who supported the view of the Walker District Council, and Mr. Cruddas, on behalf of the promoters of the Bill. After considerable discussion, the Chairman said he thought the discussion pointed to the desirability of the Walker Council's Provisional Order and the Gas Company's Electric Lighting Bill being considered together before the same Parliamentary Committee. After this intimation from the Chairman of Ways and Means, the Parliamentary Agents felt that it was not desirable to offer any further opposition to the Bill in the House, and they, therefore, did not see any members or circulate any statement. On the Bill going up for second reading, Mr. Hedderwick stated that he knew nothing of the local circumstances; but he opposed the Bill on general public grounds. The President of the Board of Trade, however, made no sign, and no member rising to second the rejection, the Bill was read a second time. After the suggestion of the Chairman of Ways and Means, the Sub-Committee of the Council will prepare to support the Council's Order, and oppose the Gas Company's Bill before the Parliamentary Committee. The Board of Trade has sent the Council's Provisional Order in the form in which they propose to issue it. The "transfer" clause will not be included in the Order, but the Council will, under the Electric Lighting Act, 1882, and their general powers, have the right of contracting if they wish to do so. The Committee's report was adopted.

Material progress has been made with the scheme for the provision of an extensive installation of electric power in the manufacturing district of South Staffordshire and East Worcestershire. The enterprise is promoted by a Syndicate under the title of the Midland Electric Corporation for Power Distribution, Limited, and which will in due course be developed into a public Company. The Corporation, having secured the consent of a very compact group of districts, obtained last year parliamentary powers to carry out their scheme. The concession embraces Wednesbury, the urban districts of Bilston, Coseley, Darlaston, Heath Town, Rowley Regis, Sedgley, Short Heath, Tipton, Wednesfield, and Willenhall, also the parish of Bentley in the rural district of Walsall. These places have an aggregate population of 192,388. The district of Kingswinford, with a population of 17,832, already possessed an Order; but the District Council have agreed to transfer it to the Company. The basis of an arrangement has also since been come to between the Company and the Oldbury District Council. The Authorities of three other areas—viz., Amblecote, Quarry Bank, and Walsall Rural—have consented to a further application which the Company are making in the present session. With these additions, they will have an area containing a population of 251,768. The Company have concluded negotiations for the purchase of a site for a generating station on the West Bromwich side of Tipton, with ample canal and railway facilities for the supply of coal; and from this no main or feeder to the outskirts of the district need exceed eight miles in length. A commencement is proposed to be made with plant of 5000-horse power, but with arrangements to admit of easy extensions. The site chosen has an area of 30 acres; and the extensions can be readily carried to 40,000-horse power, if required. Before raising their capital, the Company are engaged in a further effort to convince the Authorities of Dudley, Brierley Hill, West Bromwich, Handsworth, Smethwick, Halesowen, Lye, and Stourbridge that it would be to their interest to come within the scope of the scheme. The terms on which the Company have agreed to supply are: For lighting purposes, 6d. per unit for the first 100 hours of supply per quarter, and 3d. per unit for subsequent hours, with discounts of from 5 per cent. to 20 per cent. where the consumption is over 100,000 units per annum. For power purposes, the rates are to be 3d. per unit for the first 78 hours' supply per quarter, and 0·825d. per unit for subsequent hours. The Company offer the current to local authorities for public lighting at 1·6d. per unit.

The two applications lodged for Provisional Orders regarding the supply of the electric light to Leamington formed the subject of a Board of Trade inquiry in the town, by Major Philip Cardew, R.E., an Inspector of the Board, on the 21st and 22nd ult. The promoters were the Corporation and the Midland Electric Lighting Company respectively. It was submitted that the issue which would have to be decided as between the Corporation and the Company was whether the future of electric lighting in Leamington was to be in the hands of the Municipal Authority or was to be left in those of the Company who were at the present time doing such electric lighting as was required in the town. The Counsel for the Corporation sketched the history of the Corporation's relations with the Company, commencing in 1886, when Mr. Arthur Chamberlain approached them with a view to their entering into an agreement with the Company as to electric lighting. He submitted that the very last thing the Company now really wanted was a Provisional Order. They had begun the supply of electricity merely under an agreement with the Corporation; and they would never have applied, under any circumstances, for an Order if they had not been driven to it. He contended that what the Company wanted was "their perpetual and unlimited rights and privileges;" and as they did not really and honestly want a Provisional Order, he trusted the Board of Trade would gratify them by not giving it to them, but would give it to the Corporation, who did honestly and genuinely want it. In the course of the evidence given in support of Counsel's opening statement, the circumstances were explained under which, in 1891, the Corporation gave the Company notice to determine their contract for street lighting; and since then the streets had been lighted by gas. In public buildings, shops, and houses, the light supplied by the Electric Light Company was insufficient; and it had gone out several times during the present winter. The Company had, however, shown considerable activity lately, and the light had been better. The Solicitor for the Corporation said the contract between the Company and the Corporation, to which allusion had been made, was maintained by the Corporation to be *ultra vires*. For the Company, Counsel contended that they took up the matter of the electric light in Leamington in 1886 or 1887, when electric lighting was in its infancy; and it was not until 1897 that they obtained a small dividend. They therefore felt that just at the time when there was a likelihood of their getting back some return for the money expended it was a little more than hard, it was unjust, to seek to deprive them of their undertaking, and that at a ruinous sacrifice. It was on the faith of the dealings of the Corporation that the money was spent; but the application by the Corporation was to get rid of their agreement with the Company. It was true the original intention of Mr. Chamberlain was to obtain a Provisional Order. But he delayed doing so; and when he applied in 1890 the Corporation opposed him—their complaint then being in reference to street lighting. It was unjust in every way to seek to deprive the Company of the opportunity of getting some return for their money. If the agreement with the Corporation was *ultra vires* in the first instance, then the moral obligation was all the greater; and the Company had the more need for the protection of the Board of Trade. Mr. Arthur Chamberlain detailed his negotiations with the Corporation. He at first intended to put down a temporary installation, but subsequently decided to have one of a permanent character. The Council gave him power to lay and maintain cables, and supply the electric light; and the agreement was drawn up, signed, and sealed by the Corporation, who knew perfectly well what they were agreeing to. In 1897 the Company began to earn a little money. They had carried on the undertaking for twelve years before doing so; and now when they were turning the corner the Corporation were trying to confiscate the property. If the Company got their Provisional Order, they would supply at a lower rate than now. He was perfectly certain, unless the Board of Trade would divide the area, there was not room for two electric light concerns in Leamington. In conclusion, he said that if the Corporation got their Order, and he did not, he was prepared to argue the validity of his agreement for all it was worth. The Inspector said he would report to the Board of Trade.

EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Assembly of Proprietors of this Company was held at the Offices, St. Helen's Place, Bishopsgate, last Thursday—Colonel Lockwood, M.P., in the chair.

The Secretary (Mr. I. A. Crookenden) having read the notice convening the meeting, the report and accounts, the principal features of which were given in the "Journal" last week, were taken as read.

The Chairman moved the adoption of the report and accounts and the declaration of a dividend at the rate of 7 per cent. per annum, less income-tax, on the ordinary stock of the Company for the six months ended Christmas last. At the outset of his remarks, he expressed the regret which was felt by the Directors at the retirement of Mr. George Banbury from his position as Chairman. Fortunately for themselves—and for the proprietors also, he thought—they had persuaded Mr. Banbury to remain on the Board, where his long experience and untiring energy must, they felt sure, be of the greatest advantage to the consumers and the shareholders. For a period extending over six years, during which time Mr. Banbury filled the position of Chairman of the Board, there was no doubt that the Company passed through a series of crises demanding the exercise of the greatest tact and energy. Ably assisted by the officers of the Company, and having by his intelligence secured the unswerving loyalty of his colleagues, their late Chairman was, however, able successfully to combat these difficulties. But the continued strain and ever-increasing responsibility made too great a demand upon their colleague's strength; and on the resumption of the constant supply in December last, he was reluctantly compelled to retire from the office. The Board having unanimously requested him (Colonel Lockwood) to assume the highly responsible duty of Chairman, he had accepted it in the hope that he might be of service both to the proprietors and the consumers. The accounts showed that during the past half year the revenue had increased £3375 as compared with the corresponding six months of 1897—an increase for the whole year of nearly £15,000; giving proof that there was plenty of elasticity and commercial vitality in the undertaking. A very large portion of the Company's district comprised houses of the poorer class, with low rateable values, and those annually built were more or less of the same description; consequently, they received less per house for water-rental than any other Company. Still, the enormous trade turnover, the extended building operations, and the increased meter-rents favourably augmented their revenue. Under the head of maintenance, the increase reached the tremendous total of £35,000. During the drought, all the water that could be spared by other Companies was taken and distributed in the East London district; and it would be seen that this water alone cost the Company upwards of £21,000, while the distribution and other expenses incurred by the Local Authorities had entailed upon the Company the expenditure of a further sum of probably about £11,000—making roughly £32,000. It would be observed that the sum payable to the Chamberlain of London under the sinking-fund provisions of the Company's Acts of 1886 and 1894 amounted to £1671, and had been debited in the account. The sinking fund was first established in 1886 by Lord Claud Hamilton's Committee, because purchase of the Companies was then imminent; and this was stated to be the reason for forcing it on the Company, that they might not get a profit out of the new capital then being asked for. If purchase were not imminent, its introduction was unprecedented; and it applied to no country water company anywhere. The increase of water-rates (£5874) might be considered satisfactory, though not so large an increase as for the corresponding period of 1897 over 1896. The enormous expenses incurred by reason of the drought to which he would refer accounted for a good deal of this deficiency; the amount received from the public authorities being very much less. The Directors frankly admitted, and deeply regretted, the shortness of the supply of water during the latter part of 1898. Their Company were the pioneers of the constant service, and adopted it, not only without any notice from the Local Authorities to do so, but without even a suggestion outside the Board-room that it should be given. The Company had always been alive to the growing requirements of the district as the population increased. From the foundation of the Company in 1808 up to the present session of Parliament, they had introduced a large number of measures for securing and improving their supply, and

for the increase of works, plant, machinery, and storage; and their policy of meeting all requirements had been consistently pursued, and would, had it been allowed to prevail, have been sufficient for all needs, with the exception of the unexampled drought of the past year. In 1890, the Directors foresaw that greater storage capacity would be needed within a very short time. Steps were at once taken to survey land and to prepare estimates for acquiring the same and for the extension of reservoirs. In 1893, a Bill was introduced to carry out the first instalment of the reservoir scheme, which their Engineer (Mr. W. B. Bryan) had laid fully before the Commission. What became of that measure was notorious. Opposed by the London County Council on the ground that it was unnecessary, and only introduced for the purpose of enhancing the selling price of the undertaking (as was stated by the member for Hoxton), the Bill was rejected on second reading. In 1894, a Bill almost identical in terms was introduced, and only passed the second reading by a majority of one; for it was strongly opposed by the London County Council Members of Parliament. When the measure went before the Committee, however, the preamble was not only declared proved, but the Committee urged that the works contemplated should be pushed forward with all possible despatch; and they inserted a special clause in the Bill to render this obligatory on the Company. It should be borne in mind that if the 1893 Bill had not been rejected, the temporary reversion to intermittent supply in the years 1895 and 1896 would not have been necessary. With respect to the recent drought, it was unparalleled in severity and continuance, and followed a series of droughty periods. It continued for sixteen months up to last October, and during this time there was scarcely a drop of rain, and the daily flow of the Lea for each month was 16, 12, 6, 2, and 5 million gallons. The average yearly fall in the Lea Valley was about 27 inches; but from September, 1897, to September, 1898, it was only about 13½ inches, or just half. No such deficiency had been observed during the 82 years in which records have been kept at Greenwich; and, as they knew, the scarcity was felt over a very wide area, and many places suffered from want of water far more severely than East London. On the 22nd of August last, the Company were obliged to resort to the intermittent supply; and this was continued up to the 7th of December. At the end of February, they had 1200 million gallons of reserve water. The central fact of the occurrence was the almost total failure of the River Lea, caused by the long drought, as he had already explained. All the work authorized in 1894 had been completed by the summer of 1897, and the storage had been increased by 1200 million gallons. Warned by the experience of 1896, they went again to Parliament in 1897 for power to increase their storage (the land had been nearly all acquired, and the new reservoirs were on the eve of construction); but the failure of the Lea set all the previous experience of their Engineer and other Water Engineers at defiance. The Engineer's estimate of future requirements and possible drought could only be based on the worst and lowest figures of previous years. It would seem as if Dame Nature had said to them: "Figures and statistics shall prove of no avail; I will upset your nicest calculations." The gauges at Feilde's Weir had previously shown an average of 20 millions a day for the three driest months. In 1896, the flow for three months over the weir was 22, 19, and 14 millions. Had the river fallen no lower than this, and had the drought of 1898 been only a moderately unusual one, the resources would have sufficed to tide over the period without any stoppage of the constant supply. They had been asked why they did not make the necessary connections until after the scarcity began; and they had been blamed for neglecting to do so. But the only Company who had water to spare was the New River, with whom they made arrangements in July to give them all they could spare. The only other Company who had water available for them was the Southwark and Vauxhall; and they had none until their Bill (which became law on the 25th of July) was passed. It was of no use making connections until there was something to pass through; and their communications with the Southwark and Vauxhall Company were commenced in August and finished with unexampled rapidity. It might be remarked that the Southwark and Vauxhall Bill was opposed by the London County Council, as was also the East London Bill of 1897, authorizing them to take water, in case of emergency, from other Companies. If, therefore, the Council had had their own way, there would have been no possibility of help at all, except perhaps from the New River Company. When the Directors found there was a necessity for shutting down the constant supply, they did everything that human beings could do to mitigate the inconvenience. All the Local Authorities had a free hand to distribute water by means of carts; stand-pipes were erected all over the district; pans and other vessels were provided free of charge by the Company; and no expense was spared to mitigate the inconvenience which naturally arose from the intermittent supply, after the lavish constant service which the Company had given. It might be interesting to know that so unlimited was the discretionary power given by the Directors to the Local Authorities that in one district the distribution of the water by carts had cost as much as 20s. per 1000 gallons, equal to upwards of 40 times as much as the Company would get per 1000 gallons for the whole of the water distributed by them. In face of all this anxiety and distress and outlay, he could not help regretting that a section of public men should have made the calamity an occasion for political agitation and accusation against the Company. While the Directors were daily striving to alleviate the inconvenience from which the people suffered, some Members of Parliament were condemning their administration. He could not help thinking that it would have been more seemly and consistent on the part of the representatives of the people in the East London district if their language had been less inflammatory, and more consistent with facts. The simple truth was that the drought, which was universally admitted to have been the worst ever experienced, was the cause of the whole trouble. It was beyond the forecast of any human being, and was a disaster for which nobody was responsible; and it was felt in many parts of the country more severely than in the Lea Valley and the East-end of London. According to any calculations that could have been made from previously-recorded figures, the Company's resources were sufficient. The new services laid on numbered 3695, which was 928 more than were connected in the corresponding half of 1897. These new supplies averaged £1 3s. 1½d. per house, or about 2s. above the average all over, but 1s. 9½d. per house less than the average for the corresponding period of the previous year. In addition to this, 235 new meter services had been connected, which was about the same as before. Meters had been very generally adopted where there were uses for water other than for domestic purposes. The average per house naturally fluctuated according to the description of the residence erected. Upon the whole, perhaps, it might be considered satisfactory, as some of the houses were better built and better fitted than older tenements in the Company's district; and hence the amount of rate was not everything. The economic use of water and the absence of waste accounted for a good deal of the financial result of the past half year. One of the principal works carried out during that period was the laying of a 24-inch main from the Company's reservoirs at Hagger Lane through Snaresbrook and Wanstead, and the continuation by means of a 15-inch main across Wanstead Flats and Forest Gate into East Ham, for the purpose of increasing the pressure there and in the easterly portion of the West Ham district. The main had now been in use for some time, and had answered its purpose very well. In October the Directors ordered a new powerful triple-expansion pumping-engine, of a capacity of 10 million gallons a day, for the Essex district, the increase of which was going on at an abnormally rapid pace. This engine should be at work by the autumn of this year. All the engines, mains, and plant had been kept in good condition. The Deacon meter system had been extended, with most satisfactory results. The Royal Commission on the Metropolitan Water Supply, alluded to in the last two reports, had now finished taking evidence and hearing the arguments of Counsel, and had sat altogether for 64 days. The report would be anxiously looked for both by the Company and by the public. The Commission issued on the 20th of December an interim report, in which they dealt with the question referred to them as to the wisdom of intercommunication between the Companies' systems during the recent drought, the unusual severity of which was recognized. The schemes for coupling up the mains of the various Companies, as well as the intercommunications already made to supply the East London Company in particular, were favourably reviewed. At the Wharncliffe meeting of the proprietors held on the 9th of February, the two Bills promoted by the Company now before Parliament—one for the extension of the reservoir capacity in the Lea Valley and the other for obtaining and ensuring a temporary supply in case of emergency, and so legalizing the means of obtaining water from the Southwark, the Kent, the New River, the Grand Junction, and the West Middlesex Companies—were approved; and both of these Bills had been read a second time. The *pros* and *cons* of the Bills would be sifted by the Committees after Easter. There was also a joint Bill, promoted by the eight Metropolitan Water Companies, which had been read a second time, providing for a large and complete system of intercommunication for any emergency, and for obtaining, by any Company, water, and, if need be, by a greater supply from the Thames. This was the scheme as submitted to the Royal Commission, and approved by them. This Bill likewise was sanctioned by the shareholders at the same Wharncliffe meeting. The Government had also introduced a Bill dealing with intercommunication between the Companies, and the supply of water "by the Company which has to the Company which needs." He would like to explain that, though the Commission had not yet reported, the London County Council had introduced four Bills dealing with the water supply. The first was the same unfair Bill which they had brought forward before for acquiring the Company's property. The undertaking was to be transferred to the Council in 1900, the price to be ascertained afterwards by a one-sided arbitration, which the Council could postpone; and yet, forsooth, the Company's books, servants, and property generally were to be handed over to the Council. The second Bill was to enable the Council to acquire a large watershed in Wales, and to construct reservoirs there. The other two measures were incidental Bills. Fortunately, the House declared that the Welsh reservoirs Bill must not be considered until after the report of the Commission had been issued; and the Council had themselves put off for the present the second reading of their Purchase Bill. Tenders for £1,500,000 of 3 per cent. debenture stock issued under the Company's Act of 1897 were received, and the stock allotted on the 12th of December. The average price realized was £100 8s. 9½d. per cent., the whole of which has been duly paid. The Directors recommended a dividend at the rate of 7 per cent. per annum, less income-tax, for the half year, payable on the 13th of April. This would absorb £60,219, and leave an unappropriated balance of £14,997. The purity of the Company's water had been certified by Sir Edward Frankland, Professor Sir William Crookes, and Professor James Dewar, as usual. The oxygen required to oxidize the organic matter was 0·052 grain per gallon; being the lowest of all the Companies except the New River. In conclusion, the Directors had the fullest confidence in the future commercial prosperity of the Company. They believed that, if the proposed Bills became law, they had safeguarded themselves against such a calamity as fell upon them last year; and they were sure that the shareholders would co-operate with them in the future, as they had done in the past, in making the necessity for a good and copious supply of water assured, and in seeing that the true interests of the consumers were not overlooked.

Mr. Herbert Dalton seconded the motion.

Mr. F. Tendron referred to what the Chairman had stated regarding the opposition which the Company's Bills had met with on the part of the County Council, and said he could understand that, having acted as they had done, the Council, when called to account, would endeavour to justify themselves by stating that they had acted as they had thought best in the financial interests of the ratepayers. What, however, he could not understand was the audacity of the Council in endeavouring to show that the responsibility rested with the Company, and in arousing the ill-feeling of the whole of the East-end of London by their Members of Parliament and their public speakers against the very Company whom they had prevented from carrying out works which would have avoided the ill-effects of the late drought. What was the policy of the Council now? The associated Water Companies had brought forward a scheme which would cost them a large sum of money without bringing them in any additional income, but which would make the East-end of London secure, even should another drought occur like that of 1898. In the face of these facts, the Council were not ashamed to oppose and obstruct this scheme in every possible way. The Chairman of their Water Committee—Mr. Dickinson—gave evidence, when the Government Bill was under consideration by the Select Committee, showing that the Council had only two ideas. One of them was to acquire the Water Companies'

undertakings, and at less than their real value; and the other was to prejudice the Companies by exciting every passion that could be aroused against them in the minds of uneducated people, who did not know the whole of the circumstances. He (Mr. Tendron) maintained that a good deal of responsibility in this connection attached to a portion of the London Press; and he considered it monstrous that men in the high position of editors of the papers in question should mislead the public in the way they had done, setting an example of personal vilification of officers of the Company that would be disgraceful even in the lowest American yellow rag. He thanked the Chairman for the full information he had given the proprietors on that occasion, and also for the language he had used; and he might say that he had heard Colonel Lockwood use even stronger language before the Royal Commission, but quite as truthful as that which he had just employed.

The CHAIRMAN then put the motion for the adoption of the report, and it was carried unanimously.

The retiring members of the Board (Messrs. Dalton, William Smiles, M.D., and Herbert Helme) and the retiring Auditor (Mr. Tendron) having been re-elected,

Mr. TENDRON proposed a cordial vote of thanks to the Chairman and Directors; referring especially to the eminent services which had been rendered to the Company by Mr. Banbury and Colonel Lockwood.

The motion was seconded, and unanimously adopted.

The CHAIRMAN, in reply, said he quite agreed that they could not thank Mr. Banbury too much. With regard to his own services, he confessed he felt that the responsibility which he had undertaken was an enormous one, and one which increased almost daily, owing to the ever-changing habits of Parliament. He believed, however, that with the assistance of the officers and of his brother Directors, they would find that they had a prosperous future before them.

The proceedings then terminated.

METROPOLITAN WATER SUPPLY COMMISSION.

Sixty-Third Day—Wednesday, March 22.

(*Viscount* LLANDAFF, *Chairman*, *Sir* JOHN E. DORINGTON, Bart., M.P., *Sir* G. B. BRUCE, M.Inst.C.E., *Major-General* A. DE COURCY SCOTT, R.E., *Right Hon.* J. W. MELLOR, Q.C. M.P., *Mr.* A. DE BOCK PORTER, C.B., *Mr.* H. W. CRIPPS, Q.C., *and Mr.* R. LEWIS.)

On the re-assembling of the Commission to-day,

Mr. POPE, on behalf of the New River and Southwark and Vauxhall Water Companies, said his observations would be directed to placing before the Commission the views which these Companies entertained of their position, with the object of aiding the Commission and answering the questions submitted in the reference, which in themselves, though clear and limited, were none the easier to answer on that account. A great deal of discussion which would otherwise have been relevant was excluded from consideration. For instance, the general question of the acquisition of water undertakings by municipal corporations was hardly involved in the mere question of finance, which, after all, was only one ground on which acquisition might be desirable or undesirable. Considerations of public health, and so on, rather induced Parliament to favour municipal enterprise; and he would not object to subscribe to the general proposition that where an undertaking was carried on for the purpose of supplying a common necessity, which in its nature involved something of a monopoly, it might be wisely managed by the community on behalf of the community. How far this proposition ought to be limited, was receiving attention, apart from the discussion whether, purely upon financial grounds and in the interests of the ratepayers or consumers, the acquisition of the London Water Companies by a public authority was desirable. Paraphrasing the first question which the Commission were called upon to answer, it was whether it was "worth while," in the interests of the ratepayers and consumers, to acquire by purchase the London Water Companies. He was bound to admit, on the part of the Companies, that they were estopped from contending that purchase at a fair price would work any injustice to them. When they agreed with Mr. Smith, and were acquiescent in Lord Cross's Bill, they assented to the principle of purchase at a fair price; and it was no use trying to disguise the fact that this controversy had been embittered for years, and still remained embittered, by the rooted conviction on the part of the Companies that the London County Council neither wished nor intended to deal fairly with them. He could not help saying that the policy which the County Council had consistently pursued rather justified the Companies in entertaining this suspicion. The constant harassment for the purpose of depreciation, the persistent insistence upon some special clause to regulate the ascertainment of the purchase price, and the general tone of uncertainty which the Council maintained, even down to the present time, all pointed to what was really one of the cardinal difficulties in the case. The Council would not say even now whether they would undertake the responsibilities of purchase, supposing that Parliament were to decide in favour of the special clause proposed by Mr. Plunket's Committee. Their policy evidently was rather to control the arbitrator than to give him the free discretion which he ought to have. There was no very great distinction between the powers which this clause would give to the arbitrator and those which he would exercise under the provisions of the Lands Clauses Act. But the objection to the special clause which would not control the arbitrator was that Parliament was supposed to mean something by all that it did; and if it were possible to give the clause an interpretation in limitation of the powers of the arbitrator, that would be the construction put upon it. Though the Companies felt that their mouths were closed as regards purchase at a fair price, they maintained that the fair price should be ascertained according to the ordinary rules provided by law for the ascertainment of such prices in similar instances. He failed to see where his learned friend Mr. Balfour Browne had shown any such difference in the position of the London Water Companies as would justify him in saying that special powers would be required by the arbitrator, who would have to take into consideration the whole of the circumstances of each particular case. If the County Council were really in earnest in saying that the arbitrator should have the fullest power to inquire into all the circumstances of each individual case, the only way in which this could be accomplished would be by letting the arbitrator alone. It was impossible to give the arbitrator special instructions without curtailing the discretion which both sides professed to desire that he should have, with a view to the accomplishment of a fair assessment of value. If by the acquisition of the Water Companies there was some grievance to be redressed, if the shareholders were in the nature of vermin to be exterminated, or if the Directors were really earning dividends by the supply of what Sir Alexander Binnie called clarified sewage, they did not deserve consideration. But abundant proof had been given on all sides that no such charge could fairly be brought against the Companies, though one could not blind oneself to the fact that, judging by their recent report, the County Council considered that the present supply of water from the Thames was unsafe and ought to be abandoned. In the event of purchase, it was obvious that the County Council would proceed with an expenditure to avoid a supply of water which they said was polluted. Assuming that the price to be paid would be a fair and proper one for the Companies, the only way in which it was possible to secure this was by getting at the value of the Companies' present and prospective income, with reasonable compensation for disturbance, which, in the case of investors who look to income rather than to permanent security of capital, became more serious than it otherwise would be. In these circumstances, he could not see where there was to be any advantage, at all events to the present generation of ratepayers or consumers, unless it came from economy of management. He had heard many advantages claimed for municipal management; but economy was certainly not one of them. Inasmuch as the members of the Commission did not belong to the category of persons who neither feared God nor honoured man, it was hardly likely that they would accede to the demands of the London County Council on the ground upon which the unjust judge granted the widow's prayer—lest by her continual howling she should weary him. This was a question which might have to be discussed elsewhere. What should induce the present generation to incur such an enormous expense as was contemplated, in view of the fact that the advantage would not accrue to them but would be confined to a future population? Just at the particular time when the work of London Government was felt to be so large and so burdensome that it was not thought desirable that it should be confided to one homogeneous body, why was the water supply any more than the other matters capable of being so administered? It would be an experiment, and the London County Council might find themselves liable to that disappointment which was the lot of many inventors when they found that the results obtainable with certainty in the laboratory were hopelessly uncertain when multiplied to the extent necessary for the manufactory or workshop. The efficient management of water-works by a corporation like Glasgow, did not afford any ground for the belief that management would be effectual, or even possible, in the hands of a single Municipal Authority for London. It was impossible to doubt that the result of the transfer of the water undertakings of London to any central authority—and more than all to the London County Council—would be that the management would be left in the hands of officials highly paid, because highly trusted. If so, where would be the saving in the rates? If the County Council were right in their contention that it was necessary to go to Wales, and that no additional water ought to be taken from the valley of the Thames, then there would have to be a scheme applicable to the whole of London, and not to any particular Company. It would be impossible for any one Company to undertake the duty of raising the capital requisite to provide for such an extension. But if it became necessary to go to Wales, the Companies would frankly admit that the capital for providing this supplemental supply would have to be raised. In their opinion, a small extension of the intercommunication scheme would meet the whole question of future supply, and the whole question of the provision of the capital. At the same time, there was no reason why the same kind of local government pressure which had been brought to bear upon the Companies in connection with intercommunication should not be brought to bear for the purpose of creating such a combination among the whole of the Companies as already existed among some of them with regard to the Staines reservoirs scheme, and compelling them to secure the raising of money in sufficient abundance for obtaining any such further supply. In considering the question of intercommunication, the Companies had also taken into account the question of the extension of its principle to the necessities of the future supply, whatever it might be; and this being so, the last remnant of financial reason for purchase might be said to have been disposed of. The Water Companies of London were deserving of very great sympathy; and it was only in the last resource that they ought to be compelled to part with the property which they had carefully built up, and made beneficial to the community. If in the last resource Parliament thought it necessary to hand them over to the central authority, if the price be fair and proper, as he had already said, the mouths of the Companies would be closed in the face of public necessity; but without public necessity, and especially when his learned friend Mr. Pember had demonstrated that financially the undertaking would be a burden to the community for many years to come, the step ought only to be taken with the gravest reluctance. If, in the event of the Companies remaining undisturbed, it was considered desirable that the public should be informed as to the results accomplished by pumping or by any of the other works, the Companies would have no objection to being made subject to further control, as it was not necessary for them to maintain any secrecy upon these matters. It seemed to them that the control was already complete; but if in the judgment of the Commission this was not so, let it be strengthened.

Mr. LITTLER having argued that if purchase were decided upon it should be under the Lands Clauses Act, and not under a special arbitration clause, submitted that the Kent Company ought not to be included in the scheme, on the ground that they were in a position to supply the whole of their present and future population from wells within their own district, at a cost of £35,000 per million gallons, as against the £96,000 per million gallons which it would cost the London County Council to bring water from Wales.

Mr. BALFOUR BROWNE then commenced his reply upon the whole case on behalf of the London County Council, and argued that it was desirable to transfer the undertakings of the Water Companies to the County Council to be managed by themselves within the Administrative County of London, and as trustees for the Outside Authorities, either to resell parts of the

undertakings to the Outside Authorities or, if so desired, to continue to be purveyors of water in bulk—leaving the Outside Authorities to distribute it within their respective districts. As he understood the reference to the Commission, it was to be either control or purchase. If it was to be control, it would be a serious detriment to the Companies, and would cost them millions of money, while the London County Council would be "on velvet." The Council, on the other hand, proposed to buy the Companies with all the disabilities under which they laboured, and to give them full and fair value for their undertakings. If there was to be control, it must be so drastic that it would prevent the Companies from earning anything like their present dividends. There would be competition in each district; the consumers would take the water which they could get at the lowest rate; and the competitors would be obliged to lower their price. In the course of fifteen years, an additional supply must be obtained either from the Thames or from Wales, involving a large outlay. The money for this could be found much cheaper by the County Council than by the Companies, who, among other things, ought to be compelled to lay their pipes beyond the reach of frost—a matter which would involve enormous expense. It was also certain that under proper control the Companies would not be allowed to charge for water which they did not supply. There were so many anomalies involved in control, and so many burdens would be placed upon the Companies by control, that there was no measure to it at all short of purchase.

The Chairman: Such a drastic control as you suggest would amount to a complete turning topsy-turvey of the whole position of the Water Companies as to rates, as to shares, as to capital, and as to almost every point in their existence.

Mr. Balfour Browne: Without it there is no control.

The learned Counsel had not concluded his address when the Commission adjourned.

Sixty-Fourth Day—Thursday, March 23.

Close of the Inquiry.

Mr. Balfour Browne, continuing his arguments upon the subject of control, suggested that competition might be made as effective in the case of the Water Companies as in the case of electric lighting and telephones. The Companies might be compelled to go to new sources of supply, to make further and better provision for filtration, storage, to prevent waste, and to do other things to improve the water supply of London; payment might be made to depend upon supply; the water-rates might be equalized throughout the whole of the Metropolis; and the capital of the Companies might be re-adjusted and their back-dividends limited to a certain period, the same as had been done in the case of the Gas Companies. This was the kind of control that he advocated; and he deprecated any rosewater control such as had been suggested by the Companies themselves. Had it not been for the infinite patience of the poor of East London, something would have been done by Parliament to put an end to a state of things which was a disgrace to London at the time of the first water famine. True, a Local Government Board inquiry had been held; but nothing had happened since except another famine. Something must be done now. Control such as he had suggested would do a great deal, but it would ruin the Companies; and though Parliament could not be asked to do this, they must either make the Companies perform their duty or else take the undertakings out of their hands and transfer them to those who could do their duty. London had come of age; and having the County Council to manage its affairs, that body ought to have the water supply in their own hands. That such a course was financially expedient had been proved over and over again in the case of other large towns; and if the County Council were going to make a loss—which was in the highest degree improbable—he would say, using the words of Mr. Chamberlain in proposing the Birmingham Purchase Bill, "The people will get dividends in health and comfort; and there will be no more water famines." In the event of purchase, clearly it must be upon the basis of income. Mr. Pember had talked about £80,000,000 as the value of the whole of the water-works of London. This was simply ridiculous; and no man in his senses could say they were worth anything like that amount. They certainly would not get anything approaching it under the Lands Clauses Act. The arbitrator would have to find out what was the capital value of the income; and when the County Council had bought it they would have got the income. Where would the finance come in? They would have obtained what they had paid for, and it would be just as broad as it was long. Then if the Companies said, "You will have to buy our prospects," he would admit that; and he would pay for their prospects, which, however, would have to be discounted to present value. If the income of the Companies was well secured, they would receive a large amount, and if ill secured a small amount. But the County Council would have behind them a far better security than the Companies had—namely, the whole of the rates of London—which would enable them to raise money much more cheaply than the Companies. Up to this point there was neither gain nor loss. Where then did the finance come in? Some of the Companies had no prospects at all, and some of them had very bad ones. The West Middlesex Company, for instance, had no prospects. They had reached their maximum dividend, and the whole of the prospects would go into the pocket of the consumer.

Mr. H. W. Cripps: Does that remark apply to the West Middlesex Company only?

Mr. Balfour Browne: I think the West Middlesex are the only Company who have paid up their back-dividends. The Kent and the Chelsea Companies are within measurable distance of doing so.

Sir J. Dorington: Therefore they would get nothing for prospective value.

Mr. Balfour Browne: Exactly. Therefore, if I gave them the same income as they have to-day, well secured, they would be no better and no worse off. The County Council would give them the money necessary for the re-investment of the capital sum which was handed to them. What more could they deserve? They wanted, in addition to the million or so that they would get, a bonus of 10 per cent.; and if this were allowed, the County Council would have to pay £300,000 for nothing—taking £33,000,000 as the value of the eight Companies.

Sir J. Dorington: What about the Stock Exchange value?

Mr. Balfour Browne: I do not think that an arbitrator could arrive at the Stock Exchange value.

Sir J. Dorington: Are you going to argue that point?

Mr. Balfour Browne replied that he was. In the first place, Stock Exchange value might be, as it was called by Mr. Fletcher Moulton, a repute value or an abuse value. Then again the Stock Exchange did not know all the circumstances of the Companies. For instance, nobody buying Southwark and Vauxhall shares last year knew that they were contravening the law by taking water from the Thames to which they were not entitled. It was thought that the Company had a perfect right to do this until the Court of Chancery enjoined them. Many shares might change hands to-day, and then none might change hands until next year. Still the quotation would stand throughout all that time. The Stock Exchange value was certainly not such a real value as would be arrived at when all the circumstances of the case were inquired into before a competent arbitrator. Mr. Banbury, M.P., a member of the Stock Exchange, himself expressed the view that the Stock Exchange value could not be taken as a real criterion.

The Chairman: Mr. Banbury implied that the market value was below the real value.

Mr. Balfour Browne said sometimes it might be below, and sometimes far above; but it was sufficient for his purpose that it was not the real value, and therefore could not be taken as an absolute test. With regard to the assertion of the Companies that purchase was not financially expedient because of the Chamberlain's sinking fund, it was a little late in the day to discuss the first principles of local government. Every corporation who had ever bought out a water company had done so upon the principle that the purchase should not burden posterity for all time. The sinking fund ought to be left out of consideration; but even including it, it was financially expedient that the County Council should buy. Supposing that they purchased in 1901, they would have an income of £1,030,000; and they would be able to effect a saving of £56,000 in respect of the sinking fund, and other economies estimated by Mr. Haward at another £50,000. If sixty years was fixed as the period for the repayment of the purchase-money, the Council would have to lay aside £33,353 for every million. If it was eighty years, they would have to lay aside £30,026; and if it was a hundred years, £28,312. It was entirely a question for the people of London to decide, whether it should be a short or a long period. If it was a short period, they would be taxed heavily, and if it was a long one they would be taxed lightly. Taking it at eighty years, with an income of £1,030,000 a year, £34,300,000 ought to buy the Water Companies, sinking fund, and everything. If the Council paid less, they would have money in their pocket; if they paid more, the people of London would have to bear the burden.

The Chairman: That figure does not include debenture interest or any compensation.

Mr. Balfour Browne: No; it does not. Compensation for what?

The Chairman: For dismissed officials, Directors, and so on.

Mr. Balfour Browne: I never heard of Directors receiving compensation. Officials do; but a large number of the officials of the Water Companies would probably be employed by the County Council.

Mr. Hollams: It was originally proposed that the Directors should have compensation.

Mr. Balfour Browne: Very likely; to keep them quiet. But we should not do it now.

The Chairman: Does your figure of £1,030,000 include assumed increase up to 1901?

Mr. Balfour Browne: No; because the increase that I am going to pay them for is the increase that I am going to get. I am going to get the prospective value for which I pay; therefore it is not included in my calculation. When the burden of that discounted falls upon me, I get the increase. If I pay too much for it, I shall be out of pocket.

The Chairman: You pay the present value of a deferred annuity; and therefore during the first half of the period you will pay rather more than you get.

Mr. Balfour Browne: Quite so.

The Chairman: I do not quite see how you can reckon the Chamberlain's sinking fund in 1901 as being a permanent part of the income that you will buy.

Mr. Balfour Browne: It will not be paid by us; it will be paid by the Companies in that year. The Chamberlain's sinking fund will have passed away so far as we are concerned. Continuing, the learned Counsel asked why London should not get possession of its water-works, if it wanted to have them. It had paid the piper; and why should it not call the tune of purchase as loudly as it could? In the cases of Liverpool, Manchester, Glasgow, and Birmingham, since the transfer of the water undertakings to the Corporations they had all of them deserted the old sources of supply, and gone to new and greatly improved sources—Vyrnwy, Thirlmere, Loch Katrine, and the valleys of the Elan and the Claerwen. In each instance the consumers were satisfied; and there had never been a proposal in any single case of transfer from a corporation into the hands of a company. Why should not the same principle as was applied to these great towns be applied to London? He did not believe that any of the Companies could go to Wales; and this was why they had entered into the Staines reservoirs scheme, for which they could raise the necessary capital, and which they could carry out by small instalments. If they went to Wales, it would mean amalgamation of the Companies, and upon this amalgamation the County Council would have something to do. Then would come the time when very drastic control would have to be applied to the amalgamated Companies. With regard to the form of arbitration to be adopted in the event of purchase, the idea of the Companies evidently was that they would get more under the Lands Clauses Act than under the special arbitration clause provisionally adopted by Mr. Plunket's Committee. He believed this was a mistaken idea.

Mr. H. W. Cripps: I cannot understand why you should be afraid of the Lands Clauses Act.

Mr. Balfour Browne: I am not afraid; but I will tell you why we prefer the special clause. The Companies know that arbitrators have foolishly got it into their heads—though it is not mentioned in the Act—that they are bound to allow a bonus; and the Companies think that under the Lands Clauses Act they could secure this bonus. By putting in an allowance for re-investment, we say that they are not entitled to any bonus; and the special clause would make it certain that they would not get 10 per cent. over and above the full and fair value of their undertakings. If you can make that clear in any other way, we shall be content.

Sir J. Dorington: What you are afraid of is the 10 per cent.?

Mr. Balfour Browne: I do not want to pay 10 per cent.

Sir G. Bruce: Or any part of 10 per cent.?

Mr. Balfour Browne: Or any part of 10 per cent. We will pay them anything which they can show they ought to have; but we do not wish to pay them a bonus. Then there is another reason why we do not want the Lands Clauses Act. Under the special clause, we should have one arbitrator—the best man who could be found for the purpose, who ought to be mentioned by name in the Act—whereas under the Lands Clauses Act we might have eight arbitrations, with sixteen arbitrators and eight umpires.

Sir J. Dorington: If you had only one Act, you would only have one arbitration, would you?

Mr. Balfour Browne: No, that is not so, because, as in the case of a railway company making a line of 100 miles, every owner has a right to a separate arbitration; and what we want is one arbitration applicable to the eight Companies.

The Chairman: As I understand it, the plan of the County Council is to equalize the water-rates inside the Administrative County of London, and to leave the rates outside as they are?

Mr. Balfour Browne: We would not have anything to do with the rates outside, assuming severance.

The Chairman: Am I to understand that the Council still consider themselves morally bound to make concessions to the counties upon the borders of London?

Mr. Balfour Browne: We think that the Outside Authorities ought to have control of their own water supplies; and we still consider the agreements that we arrived at with Surrey and Croydon financially fair and reasonable. Therefore we should be prepared to carry them out. The learned Counsel concluded by saying that if by the report of the Commission the wishes of the consumers of London, whose interests it was the duty of the London County Council to safeguard, were overridden, in the long run those wishes would prevail.

The Chairman: We will adjourn *sine die*.

The consideration of the terms of the report will not commence until after the Easter recess.

Public Lighting by Acetylene in Prussia.—The town of Oliva, near Dantzig, has been provided with an installation of plant for the public lighting of the place by acetylene, under Dr. Wolff's system. It has been arranged to serve 2000 burners, and consists of four generators, each capable of producing 1400 cubic feet of acetylene per hour. Two of the generators will be kept in reserve in case of accident. The gas is conveyed in tarred cast-iron pipes having special joints; and valves located at various points in the system allow of its division into separate sections. There are 96 public lamps, fitted with atmospheric burners; but double burners are recommended for private lighting. The service-pipes resemble those used with ordinary coal gas, but considerable care is taken that they are always in good condition. Wet meters only are employed to record the consumption; dry ones not being considered suitable for the distribution of acetylene. At Schonsee, another Prussian town, the streets are lighted by acetylene.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Easter Monday interferes with my collection of news items; and I fear that my budget this week will be small.

Whatever agriculturists and tourists may think regarding the season of the year, seeing that snow still continues to fall at intervals, it is apparent that gas managers are resolved that, for them, the winter is past. Their campaigning season in Scotland opens at Glasgow next Wednesday, when the Informal Meeting is to be held. Then in the week following—on Thursday, the 13th of April—the Waverley Association of Gas Managers meet in Edinburgh. Another season of toil is over; and the gas manager is bracing himself up to tell, for the benefit of his colleagues, what he has been doing. It is a happy arrangement.

After having been long quiescent, the workers in the Glasgow Corporation Gas-Works have begun to move for improved conditions of labour. A mass meeting of the men crowded the Albion Hall, in College Street, Glasgow, on Wednesday night. Three labour members of the Town Council sent letters of apology for absence, which was a sensible thing to do; their place being to work in the Council, and not on the public platform. The chair was taken by Mr. John Cronin, who was formerly a member of the Town Council, but who lost his seat last November. The Chairman said they were met to see if a scheme of improvement could not be brought before the Town Council with regard to the wages and the conditions of the gas workers under the Corporation. With the exception of the shortening of their hours some eight or nine years ago, no change made in the men's condition had been for the better. It was now close on thirty years since any rise in wages had taken place; and he would like to know if these were always to stand at the same figure. The Gas Department of the city was a paying one. The work of the men in the department, which at best was unhealthy, had been increased; yet their wages had not been raised, nor did they get a proper holiday. That meeting, he was sure, would do a wonderful amount of good; but the men must all combine, and not leave the work of improvement to be finished by a few. As all would reap the benefit, all must help to forward the cause. Men forced to work either on Saturday night or Sunday should receive extra remuneration. Mr. J. O'Neill, the General Secretary for the men, read the following resolution: "That we, the gas workers employed in the Maryhill, Tradeston, and Dalmarnock Gas-Works, respectfully request the Town Council of Glasgow to grant us the following concessions: (1) One week's annual holiday, with pay; (2) increase of 6d. per day in all grades; (3) time-and-a-half for Sunday labour; and (4) abolition of signing on for a specified time." The President and Vice-President of the Glasgow Trades' Council moved and seconded the resolution, which was adopted with enthusiasm. Several of the gas workers addressed the gathering.

The meeting was one of a type with which we are all familiar. Local Trades Councils get them up, or are induced (no very difficult task) to lend their countenance to them. The request to the employers is put forward by the Trades Councillors; and if it be not granted, then the workers are "organized" for overt action. It is to be observed of this meeting that the Chairman made use of most moderate language. This is a matter personal to himself; and he deserved to be commended for his

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 852.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	22½—23½	..	4 9 4	150,000	5	Nov. 30	8	Oriental, Ltd. . . .	7½—7¾	..	5 3 3
100,000	10	,,	7½	Do. 7 p. c.	16—17	..	4 8 3	135,000	5	,,	8	Do. New, £4 10s. pd.	6½—6¾	..	5 6 8
800,000	100	Jan. 3	5	Australian 5 p. c. Deb. .	104—106	..	4 14 4	15,000	5	,,	8	Do. do. 1879, £1 pd.	1¾—1⅞	..	4 11 5
200,000	5	Nov. 11	6	Bombay, Ltd. . . .	6¾—7¼	..	4 2 9	60,000	5	Mar. 29	7	Ottoman, Ltd. . . .	4½—5¼*	..	6 13 4
40,000	5	,,	6	Do. New, £4 paid .	4¾—5⅛	..	4 11 5	500,000	100	Dec. 1	6	People's Gas } 2nd Mtg. of Chicago } Bonds .	102—106	..	5 13 9
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9	848,070	10	Oct. 13	6	River Plate Ord. . . .	11—11½	..	5 4 4
240,000	,,	,,	9	Do. New . . .	213—218	..	4 2 7	250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	103—10⅞	..	3 16 2
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0	250,000	10	Mar. 29	10	San Paulo, Ltd. . . .	16—17*	..	5 17 8
159,375	,,	Dec. 15	4	Do. 4 p. c. Deb. .	128—133	..	3 0 2	250,000	10	Mar. 29	10	Sheffield A.	237—240*	..	4 3 4
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig. .	265—270*	+ ¾	4 5 2	135,000	Stk.	Mar. 29	10	Do. B.	237—240*	..	4 3 4
226,320	,,	,,	8½	Do. A. Ord. Stk. .	194—197*	+1½	4 6 4	209,053	,,	,,	10	Do. C.	237—240*	..	4 3 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11	447,427	,,	,,	10	Do. C.	237—240*	..	4 3 4
430,000	20	Mar. 29	10	British	47—49*	..	4 1 8	5,600,000	Stk.	Feb. 10	5⅝	South Metrop., 4 p. c. Ord.	140—143	..	3 14 7
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c. .	25—27	..	4 8 11	1,460,000	,,	Jan. 18	3	Do. 3 p. c. Deb. . .	101—103	..	2 18 3
75,000	10	,,	9	Do. 7 p. c. . . .	20—22	..	4 1 10	—	—	—	—	Tottenham and } A. .	—	—	—
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	10½—10⅝	..	5 11 7	—	—	—	—	Edmonton } B. .	—	—	—
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	102—104	..	3 16 11	182,380	10	Dec. 30	5	Tuscan, Ltd.	9½—10½	..	4 15 3
150,000	20	Mar. 10	8½	Cagliari, Ltd. . . .	28—29	..	5 13 10	149,900	10	Jan. 3	5	Do. 5 p. c. Deb. Red.	99—101	..	4 19 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4								
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	57—59	..	5 1 8								
550,000	Stk.	Oct. 13	13½	Commercial Old Stock .	315—320	..	4 4 5					WATER COMPANIES.			
200,750	,,	,,	10½	Do. New do. .	245—250	..	4 4 0								
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Deb. .	145—150	..	3 0 0	746,184	Stk.	Dec. 30	11	Chelsea, Ord.	320—325	..	3 7 8
800,000	Stk.	Dec. 15	10	Continental Union, Ltd.	203—208	..	4 16 2	150,000	,,	,,	5	Do. 5 p. c. Pref. .	168—173	..	2 17 10
200,000	,,	,,	7	Do. 7 p. c. Pref. .	187—192	..	3 12 11	160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	150—155	..	2 18 1
51,600	Stk	Feb. 24	14	Croydon A 10 p. c. . .	305—310	..	4 10 4	175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	155—160*	+½	2 16 3
168,400	,,	,,	11	Do. B 7 p. c. . .	255—265	..	4 3 0	1,720,560	Stk.	Oct. 13	7	East London, Ord. . .	218—223	..	3 2 9
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	130—135	..	3 17 9	654,740	,,	Dec. 30	4½	Do. 4½ p. c. Deb. .	158—161	+1	2 15 11
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0	390,000	,,	,,	3	Do. 3 p. c. Deb. .	102—104	..	2 17 8
486,090	10	Jan. 27	11	European, Ltd. . . .	23—24	..	4 11 8	700,000	50	Dec. 15	7½	Grand } 10 p. c. max. .	112—115	..	3 5 3
354,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9	310,000	Stk.	Mar. 29	4	Junction } 4 p. c. Deb. .	135—140	−1	2 17 2
14,993,075	Stk.	Feb. 10	4%	Gas- } 4 p. c. Ord. . .	115—118	+2	4 3 0	708,000	Stk.	Feb. 10	14	Kent	360—365	..	3 16 9
2,400,000	,,	,,	3½	light } 3½ p. c. max. .	101—103	..	3 8 0	160,000	,,	,,	7	Do. New, 7 p. c. max. .	210—215	..	3 5 1
3,799,735	,,	,,	4	and } 4 p. c. Con. Pref.	127—129	..	3 2 0	1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max. .	298—303	..	3 9 4
3,843,975	,,	—	—	Coke } 3 p. c. Con. Deb.	101—103	..	—	406,200	100	,,	8	Do. 7½ p. c. max. .	230—235	..	3 8 1
70,000	10	Nov. 11	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4	350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	135—140*	−1	2 17 2
3,800,000	Stk.	,,	10	Imperial Continental .	223—228	..	4 7 9	500,000	100	Feb. 11	13⅓	New River, New Shares	433—438	..	3 2 9
376,400	100	Feb. 1	4	Do. 4 p. c. Deb. Red.	98—101	..	3 19 3	1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb. .	137—142	..	2 16 8
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb. ,,	102—105	..	3 6 8	902,300	Stk.	June 29	7½	South- } Ord. . . .	203—208	..	3 12 1
75,000	5	Nov. 30	6	Malta & Medn., Ltd. .	5—5½	..	5 9 1	125,500	100	,,	7½	wark } 7½ p. c. max. .	190—195	..	3 16 11
560,000	100	Oct. 1	5	Met. of } 5 p. c. Deb.	113—115	..	4 6 11	489,200	Stk.	,,	5	and } 5 p. c. Pref.	168—171	..	2 18 6
250,000	100	,,	4½	Melbourne } 4½ p. c. Deb.	107—109	..	4 2 7	1,019,585	,,	Oct. 13	4	Vauxhall } 4 p. c. A Deb.	187—142	−1	2 16 4
641,920	20	Nov. 11	5	Monte Video, Ltd. . .	15½—16½	..	6 1 3	1,155,066	Stk.	Dec. 15	10	West Middlesex . . .	300—305	..	3 5 7
617,946	Stk.	Feb. 24	9½	Newc'tle & Gateshd Con.	228—233	..	3 19 5	200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	159—162	..	2 15 7
264,855	Stk.	Dec. 30	3½	Do. 3½ p. c. Deb. .	107—110	..	3 3 8	200,000	,,	Mar. 10	3	Do. 3 p. c. Deb. .	101—103	..	2 18 3

* Ex div.

moderation. But as to the resolution, the feeling is different. The first condition is not altogether unreasonable, provided it were restricted to hands who are practically permanent, or who may have been a year or two in the employment. The second ought not to be looked at. There were about 800 men at the meeting, which is certainly not all the employees in the gas-works. Even were there no more, the financial proposals made would entail an additional outlay of nearly, if not quite, £8000 a year. With respect both to the second and third conditions, a little concession might not be out of place; but then everything there depends upon the present conditions of employment with reference to similar employments. It will be observed that no such comparisons were made. This is quite in accordance with the policy generally pursued, which is to get wages raised in one department of labour, and then to use it as a lever for raising others. If a soft-hearted Town Council could be prevailed upon to increase the wages of gas-works labourers, then labourers in other departments of the Municipality, as well as the employees of private firms, might be expected to make demands for corresponding advancement. For it is to be remembered that, with the extensive application of machinery to gas making, the men who are employed are nothing but labourers improved by a few weeks' practice. But the most onerous condition, and the one which, I presume, the promoters are most anxious to get passed, is the last one. So long as it is the practice to make the men sign on for a specified time, a general strike is impossible unless the law is to be broken. I shall be greatly surprised if the Corporation give way upon this point. Assuming that they do not, agitation is then likely to be resorted to; and, in this view, conciliation upon some of the other points might, if it could be granted without forming a precedent, be of some value, in the way of taking the wind out of the sails of those who are pushing the men forward.

The Edinburgh and Leith Gas Commission held a meeting on Monday, at which it was reported by Bailie Kinloch Anderson that the Works Committee had opened five tenders for the erection of buildings at Granton for the chemical works, and that they had remitted them to the Engineer to report upon. The Committee asked, and were granted, power to accept the lowest offer, in the event of everything being found to be in order. A Sub-Committee of the Works Committee reported that a considerable portion of the ground belonging to the Commissioners at Blandfield will not be required by them; and they recommended that the ground be let for 21 years. The Commissioners sent the subject back to the Sub-Committee for a report as to whether the land should not be sold outright. The Blandfield station is occupied by the largest gasholder which the Commissioners possess. The foundation is a bad one; and this, together with the fact that there is abundance of room for gasholders at Granton, has led to the resolution not to erect any more at Blandfield.

The Corporation of Glasgow recently appointed two inspectors under the smoke clauses of some police statute. The result—the first, so far as I am aware—was to be found in the Central Police Court on Wednesday, when two firms in the city were fined for allowing black smoke to issue from their works—one for nine, and the other for eight minutes, within an hour. One of the accused was the firm of Robert Laidlaw and Son, ironfounders and gas and water engineers, who were said to have contravened the statute in respect of the smoke which they allowed to issue from their works at No. 254, Dobbie's Loan. The defence was that, on account of the inequality of the demand for steam, it was practically impossible to prevent the issue of black smoke; and that appliances had been tried which, while they had a certain effect for good, were not really smoke-preventive. The firm tried their best to promote careful firing by giving premiums to their firemen. All this was of no avail against the extremely circumspect evidence of the police; and a conviction was recorded.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 30.

Sulphate of Ammonia.—Throughout the week there has been a very strong market, especially for delivery within the month; and the closing quotations are £10 17s. 6d. to £11 per ton, f.o.b. Hull and Liverpool, and £11 2s. 6d. per ton f.o.b. Leith. The most urgent demand has again been for covering speculative sales; but the home demand is well sustained, and the month closes with no stock at any point. Further purchases have also been made for April delivery at about the spot level of prices. Consumers abroad are still behind the market, waiting for easier prices, and apparently unmindful of the dearth of stocks and of the rapidly shrinking production. More attention has been given to the forward position. But makers' ideas have meantime hardened; and £10 10s. per ton is now required for April-September delivery f.o.b. Leith, and £10 7s. 6d. per ton for June-December.

Nitrate of Soda is firm on spot at 8s. 6d. to 8s. 9d. per cwt., according to quality. On the Continent, the squeeze has been somewhat removed by arrivals; and prices have eased off.

LONDON, *March* 30.

Tar Products.—Benzols continue flat and unsaleable. The enormous quantities thrust on the market by coke makers have seriously paralyzed values. Fortunately the aniline trade is reported to be good; and undoubtedly larger quantities of benzol are being consumed for this purpose. Very low prices are being accepted for crude naphtha; in many instances being lower than the actual value of creosote oil. Creosote and tar oils are in steady request; and a large business is being done in them. A little more interest is shown in anthracene; but no important business is mentioned, though makers are firm in their ideas of value. Pitch is fairly strong; but few makers have any to sell for this season, while for next a little better price is being paid.

The average quotations for the week are as follows: Tar, 14s. to 20s. Pitch, east coast, 26s.; west coast, 24s. Benzols, 90's, 7d.; 50's, 7¾d. Toluol, 10d. Solvent naphtha, 1s. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 3d. Creosote, 3¼d. Heavy oils, 57s. Carbolic acid, 60's, 2s.; 75's, 2s. 7½d. Creosote salts, 42s. 6d. Anthracene, "A," 4½d.; 'B," 3½d.

Sulphate of Ammonia continues to enjoy a strong market. For prompt delivery, makers are generally asking £11, less 3½ per cent.; while for forward, 5s. less would be taken. Stocks continue remarkably low; and production will probably run out short of the previous year.

JOSEPH AIRD
GREAT-BRIDGE.
STAFFORDSHIRE.
TUBES
AND FITTINGS
Illustrated Price Lists on Application.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The tendency of prices throughout the coal trade of this and also neighbouring districts continues upwards. With the commencement of the month there is—as intimated as probable in my last report—a general advance throughout Lancashire of 5d. per ton on all descriptions of fuel for firing purposes, including through-and-through coal, burgie, and slack, in which the leading Manchester firms are fully co-operating. This advance has been accompanied by a similar upward move in Yorkshire and South Staffordshire, where engine fuel is being put up 6d. per ton. With the continued pressure of demand, and a very general scarcity of supplies, no difficulty is being experienced in obtaining these higher prices, which reprepresent an advance of 2s. to 2s. 3d. per ton within the last six months. At the pit, prices in the West Lancashire district are now firm at 5s. 3d. to 5s. 6d. per ton for common slack, 5s. 9d. to 6s. for medium, and 6s. 6d. to 6s. 9d. for the best qualities, with burgie quoted at 7s. 6d., and through-and-through coal at 7s. 9d. to 8s. In the Manchester district, medium slack is quoted at 6s. 8d. per ton, best slack at 7s. 6d., and burgie at 8s. 9d. These prices are not only being obtained on current sales, but represent the basis for forward contracts. Round coals remain without quotable change, but exceedingly strong, at the maximum list quotations for current sales; and colliery proprietors decline to enter into forward contracts except at some advance on the present rates, which average 12s. to 12s. 6d. per ton for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and seconds Arley, 9s. 6d. to 10s. for common house-fire coals, and 8s. 6d. to 9s. for steam and forge coals. The shipping trade is moderate, with prices firm at 9s. 6d. per ton for ordinary steam coal, delivered at the Garston Docks, and 10s. at the High Level, Liverpool, or the Manchester Ship Canal. With regard to gas coals, though one or two important contracts will have to be settled within the next few weeks, the only actual business just now doing is where gas companies or corporations have run through their contract deliveries, and are requiring further supplies. In these cases, substantial advances have been required, averaging 1s. 10d. to 2s. per ton. The outlook for the future is much the same as indicated recently; the general probability being an advance of 1s. to 1s. 6d. per ton on steam coal for shipment, 1s. 6d. on locomotive fuel, and from 1s. 6d. to 2s. on gas coals, over the contract prices of last season.

Northern Coal Trade.—There is a very strong demand for coal, as usual at holiday periods, when the production is reduced, and some of the users have a desire to stock to meet their requirements. Best Northumbrian steam coals are very firm at 11s. 3d. per ton, f.o.b.; and steam smalls are about 5s. 6d. per ton, with a growing forward demand, as a few weeks must now see the opening of the shipping season. Gas coals show a further reduction of the local demand; but the shipments are still very full, and the price generally quoted for occasional cargoes is now about 8s. 6d. per ton, f.o.b. The settlement of the Rotterdam contract on a similar basis as to quantity as that of the past year, but at a price that is advanced to perhaps 8s. 3d. per ton, f.o.b., is an indication of the position of the trade in regard to contracts. It is, of course, a contract that is at a delivered price of about 12s. 6d.; and the sum previously stated is that with an estimated average cost of freight, &c., deducted. In the coke trade, there is great firmness. Gas coke is steady, without alteration of moment in the price, and with a reduction of the stocks through a diminished make.

Scotch Coal Trade.—Trade generally is easier; the disposition being to wait to see what effect the greater activity of the full shipping season will have. It is said that, meantime, splint is experiencing a decline of 6d. per ton, but that the expectation is that this fall is only temporary. The greatest demand is for small coal, for manufacturing purposes. In the case of ell for shipment, the price is easier; but owners are, for prompt delivery, holding out for rates higher than those quoted. The volume of trade continues to grow. The prices quoted are: Main 9s. 3d. to 9s. 6d. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s., and splint 9s. 9d. to 10s. The shipments for the week amounted to 111,181 tons—a decrease of 18,405 tons upon the previous week, and of 18,938 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,614,799 tons—an increase of 94,550 tons upon the same period of last year.

Incandescent Gas Lighting at Altona.—The whole of the street-lamps in Altona, the populous suburb of Hamburg, are to be fitted with incandescent gas-burners, which, with the same consumption of gas, it is calculated will give a light of just double the candle power obtained with the existing burners.

Projected Extension of the Leek Gas-Works.—At the last meeting of the Leek Urban District Council, the minutes presented by the Gas Committee contained a report from the Gas Manager with reference to the condition of the works. It stated that the annual demand for gas was steadily increasing, owing to the continued growth of the town, and that it was desirable that the Committee should begin to consider the necessity of making additions and extensions in respect of the carbonizing, condensing, purifying, storage, and other departments. The Committee recommended that the services of a gas engineer should be engaged to advise as to the extensions required; and this was adopted. It was also decided that a Committee should be formed to consider the advisability of establishing electric lighting plant.

Sales of Shares.—At a sale of stocks and shares at Leeds last Tuesday, 20 shares in the Mirfield Gas Company realized £12 10s. per share; and 150 shares in the Skelmanthorpe Gas Company changed hands at £1 6s. each. Last Thursday, Messrs. Baxter, Payne, and Lepper disposed of 400 ordinary £10 shares in the Bromley Gas Company; the prices realized varying from £21 to £22 10s. per share. On the same day, Messrs. Nethersole and Honeyball disposed of 85 £10 "A" shares in the Deal and Walmer Gas Company at an average of £20 5s. per share. A number of "A" and "B" shares in the Westhoughton Gas Company were sold locally last Wednesday at prices ranging from £12 2s. 6d. to £12 12s. 6d. apiece. At Lewes, on Tuesday, some £20 lots of consolidated original capital stock in the Gas Company realized £45 and £45 10s. each; and some £10 lots produced £22 10s.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

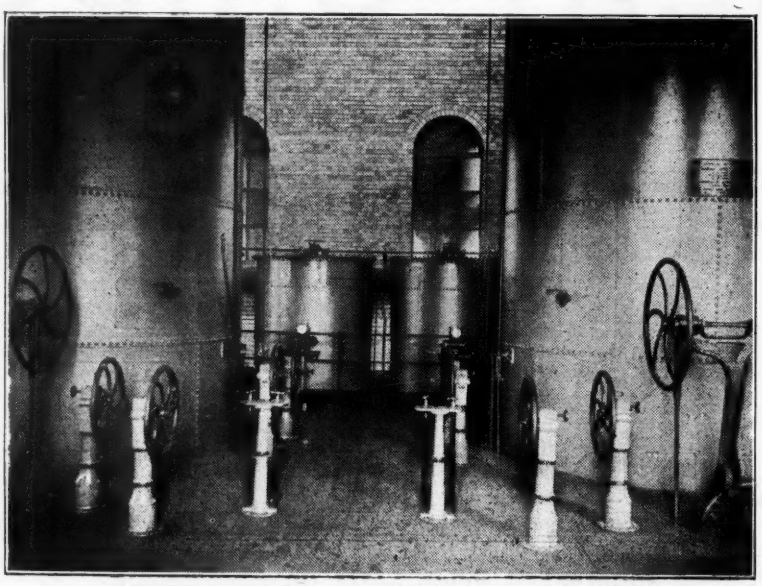
The Economical Gas Apparatus Construction Co., Ld.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

CARBURETTED WATER-GAS ENGINEERS.

THE M.-W.-P. PLANT is designed to use the Heaviest as well as the Lightest Grade of Oil.



RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

Dewsbury Water-Works Profits.—The Dewsbury and Heckmondwike Water Board met yesterday week for the purpose of distributing the surplus profit for the past year. The amount available was £3800; and it was resolved that this should be apportioned as follows: Dewsbury £2850, Heckmondwike £950.

Formby Gas Company.—The accounts of this Company, which were presented at the recent ordinary general meeting, show that the net profit for the past year, after payment of all working expenses and interest, amounted to £870, which with the balance of £309 brought forward made £1179. Out of this the Directors recommended the payment of a dividend (free of income-tax) at the rate of 5 per cent. per annum, which would absorb £499; and the transfer of £300 to the reserve account—leaving £380 to be carried forward. The Manager of the Company (Mr. J. W. Buckley) had an increased sale of gas to the extent of 1,011,000 cubic feet; the make per ton of coal (unscreened Arley) being 10,267 cubic feet of 17·50-candle gas. The unaccounted-for gas is only 2·25 per cent. For the current year, the increase has been about one-third of a million cubic feet.

The Charge against a Sheffield Accountant.—At the Sheffield Police Court, last Tuesday, Robert Kershaw, formerly Chief Accountant of the Sheffield Gas Company, was brought up in custody, charged with the attempted murder of his daughter, Agnes Kershaw, under circumstances already reported. The young lady, who had been brought from the hospital, was in Court, and gave evidence. She said her father had frequently threatened to kill her when he was under the influence of drink, in which he had indulged freely since the beginning of the year; and a witness who entered the house just after the event described the prisoner's appearance at that of one "besotted with drink." In answer to the charge, the accused said he was not guilty. He was formally committed for trial at the next Assizes, and was removed in custody.

The Progress of the Llandudno Gas Undertaking.—At a recent banquet at Llandudno, Mr. T. T. Marks, the Chairman of the District Council, in referring to the development of the town, pointed out that, under the Improvement Act of 1896, the Commissioners purchased the undertakings of the Gas and Water Company. The gas-works were then in a most dilapidated condition; and he well remembered making a report to the effect that the wonder was the works were able to produce gas at all. New works were built on the old site; the supply of gas being kept up at the same time. The consumption increased so rapidly, that in 1891 they had been able to reduce the price from 6s. 6d. per 1000 cubic feet to 4s. 3d. Seeing, too, that the electric light was going to be "the light of the future," and with a view of utilizing the gas plant, so as to work it without loss, he recommended the Commissioners to offer gas for cooking and other non-illuminating purposes at 3s. per 1000 cubic feet. This answered so well that the gas sold for this purpose amounted during the past year to 15 million cubic feet. He was also glad to recall that, during his chairmanship the price of gas had been reduced all round to 3s. per 1000 cubic feet; thus avoiding unnecessary expense in duplicating meters and pipes. The make of gas in 1876 was 12 million cubic feet, which had been increased fivefold in 23 years.

Claim for Damages for Electrolysis.—The City of Chicago has sued the Chicago North Shore Street Railway Company for $500 damages for injury done to the city water-mains by electrolysis. The claim is based upon the assertion that a large portion of the return current from the Company's trolley line passes through the water-main, and at a point opposite the power-house, where it leaves the main, very serious disintegration of the iron pipe has taken place. The "Railway and Engineering Review," of Chicago, states that this suit has been brought as a test case to determine whether or not a street railway is liable for damage of this kind.

Bude Water Supply.—The question of the water supply of Bude was again under the consideration of a Committee of the Stratton District Council last week. The advice of a London firm of solicitors had been taken as to what should be done with reference to the rule *nisi* issued by the Queen's Bench Division, at the instance of the Local Government Board, calling upon the District Council to provide a supply of water. As the Council have now entered into an arrangement for the purchase of the Bude canal undertaking with a view to the provision of a supply, it was decided to ask for a postponement of the rule pending the completion of this arrangement and the obtaining of a Provisional Order.

Warrington Corporation Bill.—A special meeting of the Warrington Town Council was held last Tuesday, for the purpose of considering and confirming the Bill to be promoted in the present session of Parliament for further provision in regard to the water supply of the borough and to improve the local government of the town. The water scheme, which will involve an expenditure of nearly £300,000 was again discussed at considerable length, as were also the other items included in the Bill. Mr. Tinnion complained that the Bill had been drawn up by two or three members of the Council, and that the other members had not received the information to which they were entitled. The Mayor (Alderman Wright) denied that anything had been kept from the members: and Alderman Roberts stated that the various Committees had fully discussed the portions of the Bill relating to them. A resolution was unanimously passed, approving of the promotion of the Bill.

The Bristol Electric Lighting Committee's Views on the Bristol Gas Bill.—Some discussion on the Bristol Gas Bill, as it passed the Lords Committee, took place at the last meeting of the Corporation Electrical Committee. It was explained that as the Bill stands, while the power to supply electric motors was struck out, the Company might still supply gas for purposes other than lighting; and, now that the agreement of 1853 is gone, they could, if they chose, supply gas for cooking, heating, and motive purposes, at less than cost, and make up the deficiency out of the charges for lighting. In other words, the agreement to light the streets at the minimum rate is practically at an end; and any loss in the supply of gas for heating or for driving engines, could be recouped on the street lighting or on the private lighting. Regarding the matter from this extreme point of view, the Electrical Committee decided to recommend the Parliamentary Bills Committee to get the authority of the Council to oppose the Bill when it comes before a Committee of the House of Commons.

COALBROOKDALE COMPANY, LIMITED.

Established 1709.

1, VICTORIA EMBANKMENT, NEW BRIDGE STREET,

Works:
COALBROOKDALE, R.S.O., SHROPSHIRE.
Telegrams: "DARBY, COALBROOKDALE."

LONDON, E.C.
Telegrams: "SEVERNDALE, LONDON."
Telephone: 1026 Holborn.

THE

COALBROOKDALE

GAS-COOKERS.

THOROUGHLY MODERN, STRONG, AND WELL MADE.

The Patent Door saves much labour and cost in cleaning. Grease cannot get into the packing. No screws on Enamel surface to set up corrosion.

A Drunkard Poisoned by Gas at Belfast.—Mr. E. S. Finnigan held an inquest at Belfast yesterday week concerning the death of John Hamilton, which occurred in his house in Charleville Street on the previous Saturday night or Sunday morning. The evidence showed that Hamilton, who was of intemperate habits, came home on Saturday night under the influence of drink, and, having threatened to kill anyone who interfered with him, went to the gas-meter, which he tampered with, and then locked himself in his bedroom. In the morning, when his wife went into the room she was met by an overpowering smell of gas, and saw her husband lying dead in bed. The gas-jet was full on. Professor Smith deposed that he made a *post-mortem* examination of the body in conjunction with Dr. Watt. He also analyzed a sample of the blood, which contained nearly 70 per cent. of carbon monoxide. In reply to the Coroner, Professor Smith said that the Belfast coal gas contained about 6 per cent of carbon monoxide; in carburetted water gas the percentage was 30. Death was, in his opinion, due to carbon monoxide poisoning. The Jury found a verdict in accordance with the medical evidence which had been given.

Exmouth Gas Company.—The annual general meeting of this Company was held last Tuesday—Mr. J. Palmer presiding. The accounts presented on the occasion showed receipts to the amount of £6257, and expenditure totalling up to £4997—leaving a balance of £1260 to go to the profit and loss account. The amount available for distribution was £2001; and the Directors recommended the payment of dividends of 10 and 7 per cent. on the original and ordinary shares respectively. They reported an increase of 6·81 per cent. in the make of gas as compared with 1897; and a continued augmentation in the number of consumers. In moving the adoption of the report, the Chairman stated that extensive additions had been made to the works, upon the advice of Mr. Willey, of Exeter, which had been most satisfactorily concluded, and were in operation, producing excellent results. Gas was supplied in Exmouth richer by 2-candle power—being 16 instead of 14 candles—than was prescribed by their Act. The Company were fully compensated for the additional cost of 4d. per 1000 feet by the universal satisfaction expressed in the town at the excellent quality of the gas. The business of the Company, consequently, was rapidly increasing, particularly in the sale of gas for cooking-stoves and through penny-in-the-slot meters. Mr. Vine, the Vice-Chairman of the Company, seconded the motion. Mr. Willey, in supporting it, said he considered the position of the gas industry in this country practically impregnable. Rival illuminants had created a desire for more light, which reacted greatly to the interest of gas companies. Referring to the approaching expiration of the Welsbach patent, he said American investors were on the alert with all kinds of burners, prepared to flood the country with them. One beautiful sample he had recently brought from London—a self-lighting burner—was the nearest approach to electrical methods yet invented. The motion was unanimously carried. The usual complimentary votes of thanks were passed to the Chairman, Directors, Secretary, and staff; and at the conclusion of the meeting the new apparatus and mechanical elevating machinery were placed in action, and a general inspection of the gas-works was made.

Gas Explosion in Piccadilly.—Shortly after noon last Thursday, while a number of workmen were engaged in the roadway opposite an hotel in Piccadilly, an explosion occurred, it is supposed through one of them striking a gas-main with his pickaxe. Several of the men were injured—four so seriously that they had to be taken to St. George's Hospital.

Consolidated Water-Works Company of Rosario, Limited.—The report for the year 1898 states that the gross revenue, after making due provision for bad and doubtful debts, amounted to £33,540, and the working expenses to £14,703; leaving a balance of £18,837. After providing for debenture stock and other interest and income-tax, writing £247 off preliminary expenses, and placing £1000 to the depreciation fund, there remains an available balance of £9964. An interim dividend of 3 per cent. has been paid on the preference shares; and the Directors now recommend a further dividend on those shares of 3 per cent., carrying the balance of £1618 to the credit of ordinary share dividend account. This amount, added to the sum of £1014 already at the credit of the account, makes a total of £2632. out of which the Directors recommend a dividend of 1½ per cent. on the ordinary shares, absorbing £1575, and leaving £1057 to be carried forward.

The Opposition to the Yeadon and Guiseley Gas Bill.—At a special meeting of the Yeadon District Council last Tuesday, the Clerk (Mr. H. Walmsley) presented a report upon the opposition to the Yeadon and Guiseley Gas Bill. He also read a letter from the Parliamentary Agents, which stated that the Counsel and Engineer engaged by the Council in the recent proceedings were strongly of opinion that the opposition to the Bill should be continued before the House of Commons Committee, as they believed that, even if the standard price was not further reduced, the electric lighting clause would be struck out, the illuminating power of the gas raised, and a testing-station obtained apart from that at the gas-works. One member also thought that some limit should be placed upon the reserve fund. At a joint meeting of the three Councils of Yeadon, Rawdon, and Guiseley on Thursday night, it was decided that further opposition should be offered to the Bill in the House of Commons. The question of the combined purchase of the works is also to be considered with a view to inserting a clause embodying some scheme in the joint petition in opposition.

Tenders have lately been received by the Directors of the West Middlesex Water Company for £100,000 3 per cent. debenture stock, repayable at par at the expiration of 25 years. Allotments were made at premiums ranging from £6 to 26s. per cent.—an average of £1 16s. 9d.

The following exhibitions of gas appliances have lately been held: By Messrs. Richmond and Co., Limited, at Chorley, Guisborough, Malvern, and Edinburgh, at each of which places they made a special feature of a complete "slot" installation, which attracted a good deal of attention; and cookery lectures were delivered by Misses Richmond, Smallwood, Barker, and Dods. By Messrs. C. Wilson and Sons, at Kirkheaton, with lectures by Miss Holroyd.

R. & A. MAIN, Ltd.

Argyle Works, GLASGOW.

Telegrams: "GASMAIN, GLASGOW."

109, Farringdon Road, LONDON, E.C.

Telegrams: "GASMAIN, LONDON."

BRISTOL:
28, BATH STREET.
Telegraphic Address: "GOTHIC."

BIRMINGHAM:
1, OOZELLS STREET.
Telegraphic Address: "GOTHIC."

MANCHESTER:
87, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."

THE

"Main" Cooker,

With Enamelled Grids and Shelf Guides.

SEVERAL COLOURS OF ENAMELLED LININGS.

Prices from - - £4 12s. 6d.

NEW SEASON'S LIST NOW READY.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER LINCOLN."

[For Illustrated Advertisement, see p. 883.]

HUTCHINSON BROS. & CO, Ltd., Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 832, last week's issue.)

Telegrams: "HUTCHINSON BROS., BARNSLEY."

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.

Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.

Before placing Orders, please write for Estimate.

Telegraphic Address: "SATURATORS, BOLTON."

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.

Apply to the BIRMINGTON CARBON COMPANY, Bowerby Bridge, YORKS.

SPENT OXIDE wanted.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.

Correspondence invited.

Telegraphic Address: "SADLER, MIDDLESBROUGH."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

A GENTLEMAN introducing Specialities for Gas Lighting in France and Belgium wishes the SOLE REPRESENTATION of a first-class MANTLELESS INCANDESCENT BURNER.

Address Circulars and Terms to No. 3237, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, in a Midland Town, for four or five Months from the middle of May, a thoroughly experienced GAS-METER TESTER.

Apply, by letter, with Testimonials, and stating Wages required, to No. 3238, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two Carbonizing Foremen, accustomed to Regenerative Furnaces and Inclined Retorts.

Apply, by letter, enclosing *copies* of three recent Testimonials as to Character and Abilities, to No. 3227 care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF IPSWICH.

WANTED, Two thorough practical Plumbers to act as WATER-FITTINGS INSPECTORS in the Water-Works Department of the Ipswich Corporation.

Applicants will be required to hold a Registered Certificate from the Worshipful Company of Plumbers, London.

Wages commencing at 35s. per week, with Uniform.

Also a WASTE-WATER INSPECTOR having a thorough knowledge of all kinds of Water-Fittings, and experienced in the detection of waste from same.

Wages, commencing at 30s. per week, with Uniform.

Applications, stating Age and Experience, with *copies* of not more than three recent Testimonials (which will not be returned), to be sent to the undersigned on or before the 11th day of April, 1899, and endorsed "Water Inspector."

HAMLET ROBERTS,
Engineer and Manager.

STATION METER FOR SALE.

A 20,000 cubic feet per hour Station METER FOR SALE, with 10-inch Valves and Connections, by J. Milne and Son, Edinburgh, in good working order. Removed to make room for larger one.

Apply to the MANAGER, Gas-Works, KIRKCALDY.

TO BRICK AND LIME BURNERS, MANUFACTURERS, AND OTHERS.

COKE BREEZE for Sale. Suitable for Brick and Lime Burners, Boiler Furnaces with forced draught. Shipped by SWANSEA GAS COMPANY, in Large or Small Cargoes.

GAS Plant for Sale, cheap to clear—

RETORT IRONWORK, several good Sets.
Six-inch VERTICAL PIPE CONDENSER complete.
Four ANNULAR CONDENSERS, 32 in. by 18 ft.
EXHAUSTERS and ENGINES, several good Sets.
TOWER SCRUBBERS, 5ft. by 20ft., 5ft. by 40ft., & others.
PURIFIERS from 5 ft. square to 12 ft. square.
STATION METERS and GOVERNORS.
GASHOLDERS, 35 ft. by 14 ft. & 50 ft. by 18 ft., perfect.
VALVES of all kinds in Stock.
IRON STORAGE TANKS.

J. FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

TO GAS AND WATER OFFICIALS.

CYCLES of the Highest Quality at reasonable Prices. Catalogue, post free. For CASH, or on GRADUAL PAYMENT SYSTEM. *Sent on approval. Twelve Months' Guarantee.*

MELROSE CYCLE COMPANY, COVENTRY.

PRACTICAL RETORT SETTER.

GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.

Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

Price 2s., Post Free.

STEPHEN CARPENTER, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.

S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

GAS-WORKS FOR SALE.

FOR SALE—Two small Gas-Works in Country Towns, together or singly.

For Particulars, apply to EDMUNDSONS, 33, Capel Street, DUBLIN.

FOR SALE—A good sound Washer, cheap, "Cockey's Patent," capacity 150,000 cubic feet per diem., with Cockey's Four-Way Valve and 6-inch Connections. The whole is in good working order, and can be seen in action.

Price and Particulars from STEPHEN TEMBLETT, Gas Offices, Gas-Works, ANDOVER.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Complete Gas Plant, consisting of Holder 40 ft. diameter by 13 ft. deep, with Guide-Framing, Inlet and Outlet Pipes, Tank for ditto, Cast Iron Condenser, Washer, Purifier, Station Meter, and Two Ovens of three Retorts each, complete with all Pipes. This Plant will be sold cheap to an immediate purchaser.

Apply to HENRY BRUCE AND SONS, Kinleith Mill, CURRIE.

FOR SALE, cheap—

Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
One " 5 ft. " 3 ft. "
One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS, GASHOLDERS and TANKS, VALVES, &c., &c.

Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

BOROUGH OF COLNE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the surplus TAR made at their Works during the Year ending March 31, 1900.

Estimated quantity, 750 Tons.

Tenders, endorsed "Tar," to be delivered to the undersigned on or before Wednesday, the 19th day of April, 1899.

FRED. THORPE,
Engineer and Manager.

Engineer's Office, Gas-Works,
Colne, Lancs., March 29, 1899.

SMETHWICK GAS-WORKS.

TENDERS FOR GAS COAL AND PURIFYING LIME.

THE Gas Committee of the Urban District Council of Smethwick are prepared to receive TENDERS for about 25,000 Tons of GAS COAL and NUTS, for delivery over the Year ending the 30th of June, 1900.

Forms of Tender may be obtained from the undersigned.

TENDERS for PURIFYING LIME, in such quantities as may be required during the same period are also invited.

Tenders, suitably endorsed, and addressed to the Chairman of the Gas Committee, should be delivered to me not later than the 24th of April next.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
W. J. STURGES,
Secretary.

Town Hall, Smethwick,
March 28, 1899.

CORPORATION OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive, on or before Monday, the 1st of May next, OFFERS of high-class CANNELS and COALS suitable for Gas Making, for delivery at their Gaythorn, Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three Years, commencing the 1st of September, 1899.

Particulars and Printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
March 17, 1899.

WALLASEY URBAN DISTRICT COUNCIL.

GAS-WORKS EXTENSIONS.

TO ENGINEERING CONTRACTORS, BUILDERS, AND OTHERS.

THE Wallasey Urban District Council are prepared to receive TENDERS for the Construction of a GASHOLDER TANK at the Gas-Works, Great Float, near Birkenhead.

Plans may be inspected, and a copy of the Specification and Bill of Quantities obtained, on application to the Engineer, Mr. J. H. Crowther, at his Offices, Great Float, on payment of the sum of £5 (Five Pounds), which amount will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, on the Form provided for the purpose, addressed to the Chairman of the Gas, Water, and Electricity Committee, and endorsed "Tender for Gasholder Tank," to be delivered per post at my Office not later than Four o'clock in the afternoon of Thursday, the 18th day of May, 1899. Tenders arriving after that time will not be considered.

The Contractor will be required to enter into a bond with approved sureties, for the due performance of the Contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk and Solicitor.

Public Offices, Egremont,
Cheshire, March 22, 1899.

WALLASEY URBAN DISTRICT COUNCIL.

GAS-WORKS EXTENSIONS.

TO MAKERS OF GAS PLANT.

THE Wallasey Urban District Council are prepared to receive TENDERS for the supply, delivery, and erection of:

(*a*) A FOUR-LIFT TELESCOPIC GASHOLDER, complete, or

(*b*) A THREE-LIFT TELESCOPIC GASHOLDER with preparation for the addition of a Fourth Lift.

Plans may be inspected, and a copy of the Specification obtained, on application to the Engineer, Mr. J. H. Crowther, at his Offices, Great Float, near Birkenhead, on payment of the sum of £2 (Two Pounds), which amount will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, on the Form provided for the purpose, addressed to the Chairman of the Gas, Water, and Electricity Committee, and endorsed "Tender for Gasholder," to be delivered per post at my Office, not later than Four o'clock in the Afternoon of Thursday, the 18th day of May, 1899. Tenders arriving after that time will not be considered.

The Contractor will be required to enter into a bond, with approved sureties, for the due performance of the Contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk and Solicitor.

Public Offices, Egremont,
Cheshire, March 22, 1899.

HOYLAKE AND WEST KIRBY GAS AND WATER COMPANY, LIMITED.

TENDERS FOR GAS COAL, &c.

THE Directors of the above-named Company are prepared to receive TENDERS for the supply of about 3500 Tons, more or less (without restriction), of screened GAS COAL, and about 600 Tons, more or less (without restriction), of CANNEL. Price to include delivery on Gas-Works Siding, Hoylake.

Tenders are also invited for the supply of about 500 Tons, more or less (without restriction), of STEAM COAL, NUTS, or WASHED SLACK, as required. Price to include delivery on rails at West Kirby Stations.

Deliveries to extend, in each case as required, from the 1st of July next to the 30th of June, 1900.

The Directors reserve the right to accept Tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, marked "Tenders for Coal," must be delivered to the undersigned not later than Nine a.m., Wednesday, April 12 next.

No Canvassing.

Printed Form of Tender will be forwarded by Post upon application in writing.

TENDERS are also invited for the purchase of any surplus TAR and AMMONIACAL LIQUOR that may be for disposal at Hoylake Gas-Works during the Year ending the 30th of June, 1900.

The Directors will not necessarily accept the highest or any Tender.

Tenders (form optional), marked "Tender for Tar, &c.," must be delivered to the undersigned not later than Nine a.m., Wednesday, April 12, 1899.

By order,
ALF. READDY,
Secretary.

8, Filey Terrace, Hoylake,
March 27, 1899.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF ORDINARY STOCK.

THE Directors have instructed Mr. ROBERT MACK to SELL BY AUCTION, at the Offices of the Company, Newcastle-upon-Tyne, on Wednesday, the 12th day of April, 1899, at Twelve o'clock at noon, £25,000 ORDINARY STOCK of the Company, to be issued under the powers of the Company's Act of 1896.

For Conditions of Sale and further Particulars, apply to the undersigned.

THOS. WADDOM,
Secretary.

Offices: 35, Grainger Street West,
Newcastle-upon-Tyne, March 21, 1899.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of 10,000 Tons of COAL and 2000 Tons of CANNEL.

Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, marked "Coal," to be sent to me not later than Tuesday, April 18, 1899.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
March 15, 1899.

THE Directors of the Shrewsbury Gas-light Company invite TENDERS for the supply of the following CAST-IRON SOCKET and SPIGOT PIPES, coated—viz.,

1200 yards of 6-inch,
1800 yards of 5-inch.

The Tenders to state weights, and price per ton delivered to Shrewsbury, G.W. or L. & N.W. Railways.

Delivery must be made during June, 1899.

Tenders to be sent to the undersigned, on or before April 19, 1899.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
March 23, 1899.

TO IRONFOUNDERS AND OTHERS.

THE Gas Committee of the Todmorden Corporation are prepared to receive TENDERS for the supply and delivery of 700 yards of 12-inch CAST-IRON MAIN PIPES; also about 300 yards of 8-inch CAST-IRON MAIN PIPES, with the necessary SPECIALS.

Full Particulars can be had, with Form of Tender, from the Engineer, Mr. Henry Hawkins, at the Gas-Works, Millwood, Todmorden.

Tenders, endorsed "Cast-Iron Mains," addressed to the Chairman of the Gas Committee, Town Clerk's Office, Town Hall, Todmorden, to be delivered on or before the 17th day of April, 1899.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
H. HAWKINS,
Engineer.

EDINBURGH AND LEITH CORPORATIONS GAS.

TENDERS FOR COAL.

THE Commissioners invite Tenders for the supply of COAL required for the Edinburgh, Leith, and Portobello Gas-Works during the Year from Whitsunday next.

The Contractors must guarantee that in the execution of their Contracts they will pay the standard recognized Rate of Wages, or such Wages as are generally accepted as fair in the trade.

Tender Forms and all Information can be had on application to the Engineer of the Gas-Works, New Street.

Offers must be lodged not later than Ten o'clock on Thursday forenoon, the 13th prox., in sealed envelopes, addressed to the undersigned, and marked "Tender for Coal."

The Commissioners are not to be bound to accept the lowest or any Tender.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
March 30, 1899.

COUNTY BOROUGH OF WIGAN.

TENDERS FOR STORES.

THE Gas Committee invite Tenders as follows:—

Contract No. 1—Cast Mains and Connections.
" 2—Wrought-Iron Tubes and Fittings.
" 3—Brass Tubes and Fittings.
" 4—Lead Pipe.
" 5—Block Tin.
" 6—Firing and Charging Shovels.
" 7—Brooms.
" 8—Wood Troughing and Covering.
" 9—Galvanized Stove-Pipe & Connections.
" 10—Bar Iron.
" 11—Street-Lamps.
" 12—Galvanized Iron Buckets.

The Contracts will be for One Year, commencing on the 1st of April, 1899, and ending on the 31st of March, 1900.

Forms of Tender to be obtained from the undersigned.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders, sealed and endorsed with the name of the article tendered for (a sample of which must be forwarded addressed to the Gas Engineer), to be addressed and delivered to J. J. Charnock, Esq., Town Clerk, Town Hall, on or before Monday, the 17th of April next.

JOS. TIMMINS,
Engineer.

Borough Gas-Works,
Wigan, March 23, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

£18,870 OF FOUR PER CENT. PERPETUAL DEBENTURE STOCK,

OFFERING TO TRUSTEES AND OTHERS AN INVESTMENT OF THE HIGHEST CLASS.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Wednesday, April 12, at Two o'clock, in Lots.

Particulars at the HEAD OFFICES of the COMPANY, in D'Olier Street, DUBLIN; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
CROMER GAS AND COKE COMPANY.

£3000 OF ORDINARY STOCK.

Ranking for a Standard Dividend of 5 per cent. per annum; the last Dividend on similar Stock having been 4 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS AND WATER STOCKS AND SHARES IN THE
KING'S LYNN GAS COMPANY,
ROMFORD GAS AND COKE COMPANY,
SOUTH-WEST SUBURBAN WATER COMPANY,
WEST SURREY WATER COMPANY, AND
FELIXSTOWE GAS COMPANY.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

£20,000

FOUR PER CENT. PERPETUAL DEBENTURE STOCK OF THE
WEST HAM GAS COMPANY,

Offering to Trustees and others an Investment of the soundest character.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, April 24, 1899, at Two o'clock, in Lots.

Particulars of the SECRETARY of the Company, at the Offices, Union Street, STRATFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of The Aldershot Gas and Water Company, the Directors of the Crays Gas Company, the Directors of the Worthing Gaslight and Coke Company, the Trustees of the late Robert Higdon, Esq., and other Owners.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Wednesday, April 26, at Two o'clock, in Lots:—

ALDERSHOT GAS AND WATER COMPANY.—300 £10 FIVE PER CENT. PREFERENCE SHARES.

CRAYS GAS COMPANY.—£2000 of FIVE PER CENT. STOCK.

WORTHING GASLIGHT AND COKE COMPANY.—300 £10 SHARES.

Also STOCKS and SHARES in the BRIGHTON AND HOVE GENERAL GAS COMPANY, and the WEST HAM GAS COMPANY.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company, and containing

USEFUL HINTS TO GAS CONSUMERS, A COMPARISON OF INCANDESCENT BURNERS WITH ELECTRIC LIGHT, &c.

BY

J. H. TROUGHTON.

Sample Copies 6d. *each.*

100, £2; 250, £4 10s.; 500, £7 10s.; 1000, £10.

The Pamphlet can be specialized to suit the Price of Gas and other Conditions of supply in any particular District, at a slightly increased Charge.

Prices for larger quantities of the Publisher:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

BOROUGH OF DONCASTER.

TENDERS FOR COAL.

THE Gas Committee of the Borough of Doncaster are prepared to receive TENDERS for the supply of 20,000 Tons of best screened GAS COAL, during a period commencing July 1, 1899, and terminating June 30, 1900.

Particulars and Tender Forms may be obtained on application to John Athron, Esq., Chairman, or to the undersigned.

Tenders should be sent under seal to the Chairman, endorsed "Tender for Coal," not later than Ten a.m., on Thursday, the 13th of April next.

By order of the Gas Committee, who do not bind themselves to accept the lowest or any Tender.

ROBERT BRIDGE,
Engineer.

Gas-Works, Doncaster,
March 20, 1899.

URBAN DISTRICT OF MILFORD HAVEN.

TENDERS FOR GAS COAL.

THE Milford Haven Urban District Council are prepared to receive TENDERS for about 650 Tons of GAS COAL, including Cannel, Large and Through, and also about 80 Tons of BITUMINOUS STEAM COAL, to be delivered between the 1st of May, 1899, and the 31st of March, 1900. The whole of the Coal to be fresh hewn, clean, and free from Impurities.

Further Particulars and Forms of Tender can be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tender for Coal," addressed to the Chairman, Gas and Water Committee, to be sent in not later than the 11th of April inst.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
THOMAS H. LEWIS,
Clerk.

Milford Haven, April 1, 1899.

CITY OF HEREFORD.

THE Gas Management Committee of the Corporation invite TENDERS for the supply of best screened large GAS COAL for One Year, from the 1st of August next, to be delivered free at the Gas-Works Siding, Hereford, in such quantities as may be required from time to time.

The estimated quantity required will be about 8500 Tons.

Full Particulars and printed Forms of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Tender for Gas Coal," are to be sent in addressed to the Chairman, Gas Management Committee, Mansion House, Hereford, by Saturday, April 8, 1899.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM PARLBY,
Gas Engineer and Manager.

Gas-Works, Hereford,
March 29, 1899.

COUNTY BOROUGH OF STOCKPORT.
(GAS AND ELECTRICITY DEPARTMENT.)

TO IRONFOUNDERS.

THE Gas and Electricity Committee are prepared to receive TENDERS for the following CAST-IRON MAINS:—

3	inch	5000	yds.,	weight not to exceed	34	lbs.	per yard.
4	"	1000	"	"	46	"	"
6	"	500	"	"	90	"	"
8	"	500	"	"	130	"	"

And also for IRREGULARS.

Forms of Tender (no other will be considered) can be obtained on application to the Engineer, Mr. S. Meunier, and the whole of such Castings to be delivered free on rail at Stockport.

Tenders, endorsed "Iron Mains," must be delivered and addressed to the Chairman of the Gas and Electricity Department, Stockport, on or before the 19th day of April next ensuing.

The Resolution of the Council that Contractors will be expected to pay the Standard Rate of Wages paid in the district will apply to this Contract; and the Committee do not bind themselves to accept the lowest or any Tender.

By order,
ROBERT HYDE,
Town Clerk.

Stockport, March 29, 1899.

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . .	10,500 Cubic Feet.
Illuminating Power . . .	16·4 Candles.
Coke	68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

The Wallsend & Hebburn Coal Company, Ltd.

B Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.
And at STROUD, GLOUCESTERSHIRE.

SANDELL'S

Gas Companies' Account Books.

The Gas Companies' Expenditure Journal.

With Printed Headings and Analyzing Guide, for keeping the Expenditure of Gas Companies upon the easiest and most correct method, and in accordance with the provisions of the Gas-Works Clauses Act of 1871. Size: 16⅝ in. by 17⅞ in.

Price: Half-bound, Cloth Sides, Two Quires, 35s.; Three Quires, 45s.

This Book and its predecessor (on the same principle, have been in use since 1867.

The Gas Companies' Rental-Book.

A companion Book to above, with Printed Headings and Illustration, for keeping the Consumers' Accounts with Gas Companies on labour-saving principles. Compact and Precise. A boon to Secretaries, Accountants, and Auditors.

Size and Price as above.

Consumers' Names are only written once in every two years by this system.

The Analyzed Wages Book.

Compiled for use in conjunction with the above Expenditure Journal, with Printed Headings, and adapted to the form for making up the Annual Accounts under the provisions of the Gas-Works Clauses Act, 1871. Size: 15 in. by 10½ in.

Price: Half-bound, Cloth Sides, Two Quires, 15s.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

ARMSTRONG'S
PATENT
CANDLE SAFETY LAMPS

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

TUBES AND FITTINGS

ALL KINDS

WRITE FOR PRICES

STAFFORDSHIRE TUBE Co., BIRMINGHAM.

INCANDESCENT GAS LIGHTING.

Incandescent Burners from **5/6 per doz.**

Specially annealed best Fireproof Glass Chimneys (equal to the Jena). **1/4** per Doz.

All other Incandescent Fittings at greatly reduced Prices.

Patentees of the "IMPROVED STANDARD GLOBE-CHIMNEY."

Best "Comet" Bulbs, 2/6 per Dozen.

Write for Illustrated Price Lists.

WHOLESALE FITTINGS COMPANY,
80, COMMERCIAL ROAD, LONDON, E.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

WELDON MUD

FOR

GAS PURIFICATION.

For use in the

RECOVERY OF SULPHUR,

ALSO

Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:

GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

Crown 4to., Price 3s. 6d.

GASHOLDER AND TANK

(Of One Million Cubic Feet Capacity)
AT THE
SUTTON GAS-WORKS.
Designed and carried out by
F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.
MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &c., WITH THE ACCOMPANYING PLATES.

Other Works by the same Author.

The Guide-Framing of Gasholders, and Strains on other Structures in Gas-Works	**6s. 0d.**
Gasholders With or Without Guide-Framing: A Discussion; and Literature on Gasholder Construction	**1s. 0d.**
Flow of Gas, and Proportioning Gas-Mains	**7s. 6d.**

PUBLISHED BY
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THORNLEY GAS COALS

WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

EVESON FOR CANNEL

TELEGRAMS: "EVESON, BIRMINGHAM."

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the
WHESSOE-MUNICH BENZOL CARBURETTER
The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

Apply to the Sole Makers
THE WHESSOE FOUNDRY COMPANY, LIMITED, DARLINGTON.

THE ATENT
"BEACON" GLOBE LAMP.

As fitted up at London Bridge Railways' Approach, and Kennington Park, S.E.

H. GREENE & SONS, Ld.,
Late of Cannon Street,
19, FARRINGDON RD., E.C.
Telegrams: "LUMINOSITY, LONDON."

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

BENZOL.

SPECIALLY prepared for Enriching Gas and PREVENTING THE STOPPAGE OF SERVICE-PIPES by the deposit of Naphthalene. Price 10d. per Gallon, free on rails at our Works in Drums (returnable).

Apply WHITWOOD CHEMICAL CO., Ltd., WHITWOOD COLLIERIES, Nr. NORMANTON.

LONDONDERRY GAS COALS

FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,
for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21 JOHN STREET, ADELPHI, LONDON W.C.

CAUTION! CAUTION! CAUTION!

Incandescent Gas Lighting.

All Dealers and the Public are cautioned against Buying, Selling, or Using the MANTLES advertised by the CONTINENTAL INCANDESCENT GAS-LIGHT COMPANY, of Rotterdam, which are AN INFRINGEMENT OF THE "WELSBACH" PATENTS.

Many Injunctions have been obtained against Sellers of these goods; and the parties connected with this so-called Company have already BEEN COMMITTED TO PRISON FOR CONTEMPT OF COURT, and have FLED TO ROTTERDAM to avoid subsequent further Imprisonment.

Large Shipments of these Mantles have been seized by Order of the High Court; and the Receiver HAS AUTHORITY TO OBTAIN POSSESSION OF ALL SUCH MANTLES.

Servants or Agents or anyone assisting to evade the Injunction already obtained, including (after this notice) Advertising Agents and Newspapers are equally liable to be committed to Prison.

A REWARD will be given to anyone giving such Information as will lead to any Shipments of these Mantles being taken possession of.

THE "WELSBACH" INCANDESCENT GAS-LIGHT COMPANY, LTD.

YORK STREET & PALMER STREET, WESTMINSTER, LONDON, S.W.

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

H. KIRKHAM'S PATENT "IMPERIAL" WASHER-SCRUBBER.

TESTIMONIAL.

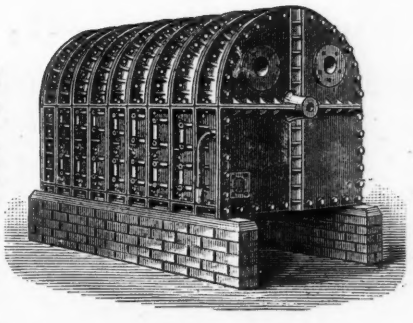
The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



EFFICIENCY GUARANTEED.

Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

OFFICE: 25, Victoria Street, Westminster, LONDON, S.W.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

MANUFACTURERS: **MAJOR & CO., Ltd.**

BENZOL FOR ENRICHING GAS

HULL AND WOLVERHAMPTON.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

CAUTION! CAUTION! CAUTION!

INCANDESCENT GAS LIGHTING.

ALL DEALERS AND THE PUBLIC ARE

CAUTIONED AGAINST BUYING, SELLING, OR USING
EITHER OF THE FOLLOWING MANTLES:—

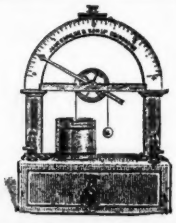
"SUNLIGHT" COMPANY'S WHITE MANTLES.
"DAYLIGHT" COMPANY'S WHITE MANTLES.

ACTIONS FOR INFRINGEMENT OF PATENT HAVE BEEN COMMENCED by the WELSBACH INCANDESCENT GAS-LIGHT COMPANY, Ltd., against both the above Companies for Infringement of Patent by the **MANUFACTURE AND SALE** of the above White Mantles.

USERS ARE EQUALLY LIABLE WITH DEALERS.

THE WELSBACH INCANDESCENT GAS-LIGHT CO., LD., YORK ST., WESTMINSTER.

JAMES MILNE & SON, LTD.,
GAS ENGINEERS,
MILTON HOUSE WORKS EDINBURGH.
LONDON. —— LEEDS. —— GLASGOW.



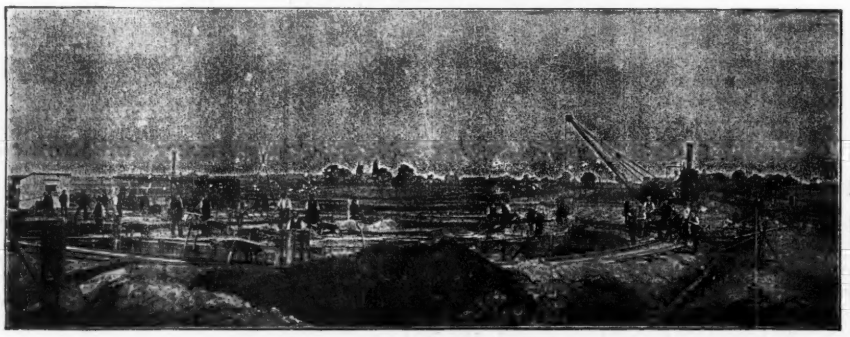
GASHOLDER TANK, EMBANKMENT, & RAILWAY

Telegrams:
"Robustness, London."

UNDER CONSTRUCTION BY OUR OWN WORKMEN.

Telephone
No. 756 Bank.

RESERVOIRS, TRIAL BOREHOLES and WELLS. MAIN and SERVICE LAYING.



COMPLETE GAS and WATER WORKS ERECTED and SET to WORK including ALL MAINS.

J. & H. ROBUS, Engineering Contractors,
20, BUCKLERSBURY, LONDON, E.C.

For Carbonizing Advt. see last Issue.

HISLOP'S PATENT REGENERATIVE RETORT-SETTINGS

These Settings are Testified to and guaranteed to produce **more Gas per day,** to be more **simple** in **Management,** to have **greater Durability,** to be **more Economical** in **Labour** and **Fuel,** and to have the **Lowest Cost for Renewals** of any system in the Market. Gas Engineers and Managers would do well to give these advantages their careful consideration, when contemplating extension of their Retort-Benches, or when filling existing Ovens.

Further Particulars from the Principal Agent, or from C. M. HAMILTON, Retort Builder, Hamilton, Agent for Scotland & Ireland.

NOTE: **The Agency held by Messrs. Drake & Son, Halifax, for England, Wales, and Abroad has now ceased; and they have no authority whatever to represent the Patentee, although persistently advertising themselves as Agents.**

All Enquiries to be addressed to R. F. HISLOP, Gas Engineer, CRAIGIELEA, PAISLEY.

SAWER & PURVES, NELSON METER WORKS, MILES PLATTING, MANCHESTER,

(BRANCH OF METERS LIMITED),

MANUFACTURERS OF

IMPROVED WET GAS-METERS IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

IMPROVED DRY GAS-METERS.

Speciality: PATENT CASH PREPAYMENT METERS.

CATALOGUE SENT ON APPLICATION.

THE SILICA FIRE-BRICK COMPANY

OUGHTIBRIDGE, NEAR SHEFFIELD.

Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.

MANUFACTURERS OF

SILICA FIRE-BRICKS

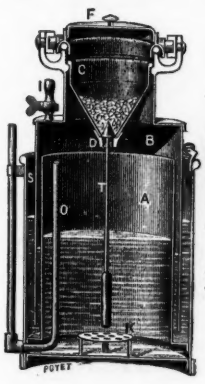
(TRADE MARK "SILICA")

Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.

BESSEMER GANNISTER, STEEL-FURNACE GANNISTER, COPPER-FURNACE GANNISTER, IRONFOUNDERS' CUPOLA SAND FINE-SETTING SILICA CEMENT, STEEL MOULDERS' COMPOSITION.

Our Silica Bricks have gained a high reputation for Unsurpassed Quality in most of the leading Firms in England and on the Continent. Export orders delivered Liverpool, Hull, Grimsby, or the Tyne.

THE LIGHT OF THE FUTURE



THE STRONGEST AND MOST BEAUTIFUL LIGHT KNOWN.

ABSOLUTELY HARMLESS.

ACETYLITE Ltd., 400, New John St. West, Birmingham.

THE ONLY SYSTEM OF GENERATING PURE ACETYLENE GAS.

Installations for Private Houses, Streets, Works, Railway Stations, Carriages, &c.

ESTIMATES AND CATALOGUES SENT ON APPLICATION.

National Telephone: No. 2481. **Telegrams: "GENERATOR, BIRMINGHAM."**

OIL FOR GAS MAKING

PURE DISTILLATE.

HOMOGENEOUS IN CHARACTER.

NO MIXTURE.

CAN BE STORED SAFELY ANYWHERE.

FLASH POINT GUARANTEED OVER 200° FAHR.

(ABEL'S CLOSED TEST.)

ANGLO-CAUCASIAN OIL COMPANY, LTD.

8, 9, 10, & 11, LIME STREET, LONDON, E.C. | INDIA BUILDINGS, CROSS ST., MANCHESTER.

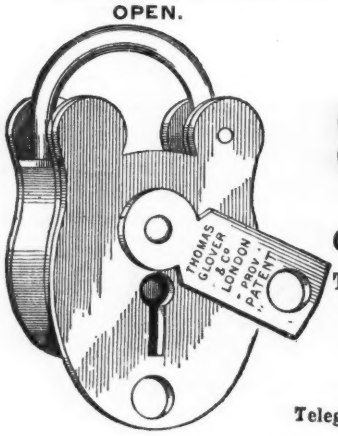
ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

PATENT

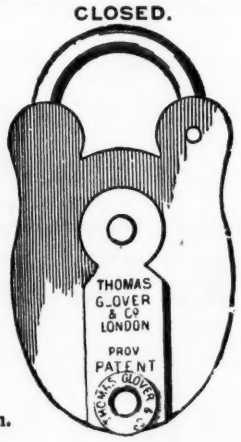
SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

CLOSED.



Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 1005.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC."*

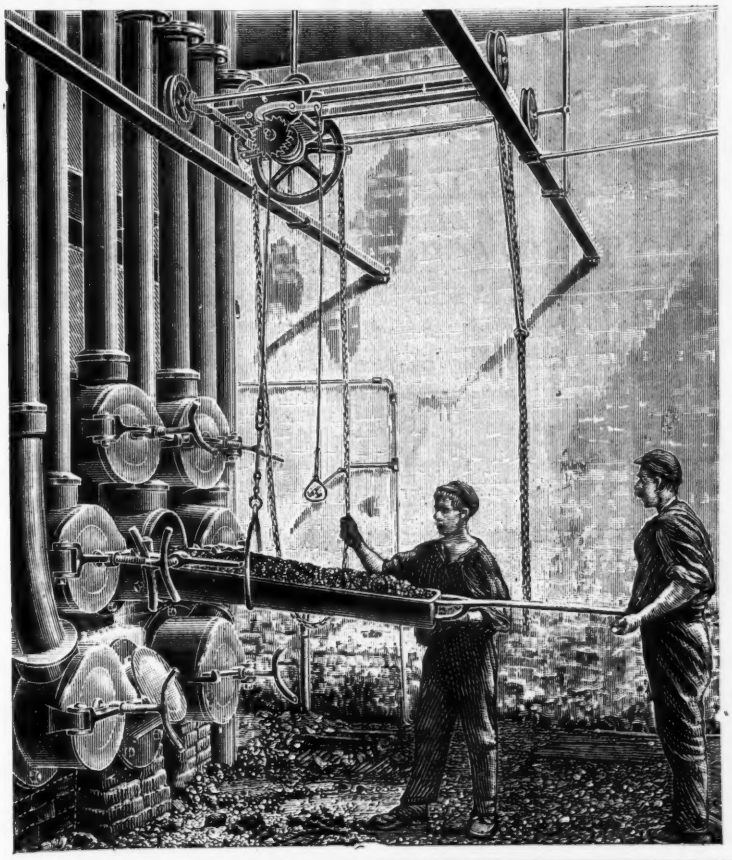
MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 3398.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address: "GASMAIN."* Telephone No. 1525 South Side.

BIGGS, WALL, & CO., SOLE LICENSEES.

THE "RAPID" MANUAL CHARGING APPARATUS.

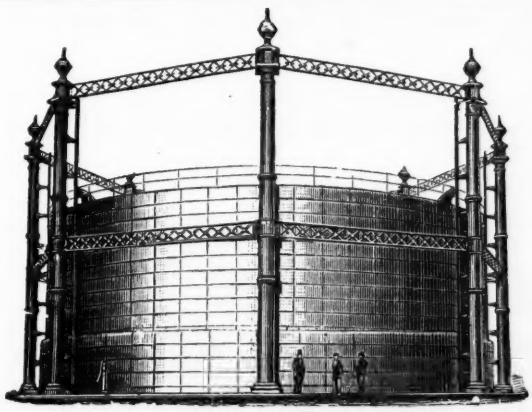
The most Economical in the Market.



Write for full Particulars to the Sole Licensees.

Telegraphic Address: "RAGOUT, LONDON."

13, CROSS ST., FINSBURY, LONDON, E.C



PORTER & CO.,

GAS ENGINEERS,
MANUFACTURERS, IRONFOUNDERS, & CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

Telegraphic Address: "PORTER LINCOLN." National Telephone, No. 13.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
References to 600 Works already erected.

N.B.—All Communications to be addressed to the FIRM ONLY.

MOBBERLEY & PERRY STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

MAURICE GRAHAM,
Managing-Director.]

Telegrams:
"ACCOUPLE, LEEDS."

GRAHAM, MORTON, & CO.

— LIMITED —

INCLINED RETORTS
AND ALL CLASSES OF
ELEVATING & CONVEYING MACHINERY.
— Contractors to Her Majesty's Government. —

LEEDS.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

ORIGINAL MANUFACTURERS OF DRY METERS IN CAST-IRON CASES.

STATION METERS, EXPERIMENTAL METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.

	ALDER & MACKAY.	W. & B. COWAN.	G. GLOVER & Co.	JAMES KEITH.	D. B. PEEBLES & Co.
Total of Fast Tests .	47·2	6·9	33 6	62·3	53·7
Total of Slow Tests .	25·3	117 4	43·1	31·4	38·5
	72·5	124·3	76·7	93·7	92 2

Descriptive Circulars, Price Lists, and Full Particulars forwarded on application.

NEW GRANGE WORKS, EDINBURGH.

LONDON OFFICE
60 QUEEN VICTORIA ST. E.C.

TELEGRAPHIC ADDRESSES
"DRAKESON HALIFAX."
"ECLAIRAGE LONDON."

TELEPHONE No 43.
"HALIFAX EXCHANGE"

GAS ENGINEERS.
CONTRACTORS.
IRONFOUNDERS.

RETORT SETTERS.
FURNACE BUILDERS.
ETC. ETC.

JONAS DRAKE & SON

SOLE AGENTS FOR
HISLOP'S
PATENT REGENERATIVE FURNACES
— FOR —
ENGLAND, WALES & ABROAD.
RETORT BENCHES ERECTED COMPLETE
WITH OR WITHOUT SPECIAL FURNACES.
RESULTS GUARANTEED.

OVENDEN HALIFAX

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

BRUNO SCHÖMANN,
Berlin (Germany), 88, Ritterstrasse,
MANUFACTURER OF
INCANDESCENT MANTLES, ORDINARY AND SELF-IGNITING ONES.
Transacts all kinds of EXPORT AND IMPORT Business in the GENERAL LIGHTING TRADE.
SPECIALITY—
INCANDESCENT GAS LIGHTING,
As all kinds of Incandescent Burners, Chimneys, Smoke Tops, Tulips, Shades, Fittings, Lamps, &c., &c. Ask Quotation for any Article connected with the above Trade before buying elsewhere.

BOWENS' Ltd. Successors,
STOURBRIDGE.
MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

G. & J. HAIGH,
Raven's Lodge Fire-Brick Works, DEWSBURY.
Manufacturers of MACHINE-MADE RETORTS and
FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.
For Prices and Analysis, apply as above.

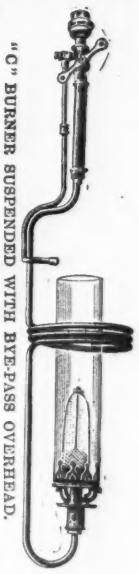
SUSPENDING ARC LANTERN.

INCANDESCENT GAS LIGHTING
The disastrous effects of SHOCKS and VIBRATIONS may now be done away with by the use of
CLAY'S PATENT SHOCK-PROOF FITTINGS,
which are the next best thing to UNBREAKABLE MANTLES.

The Illustrations show two of our arrangements; but we are able to cope with all conceivable conditions or requirements.

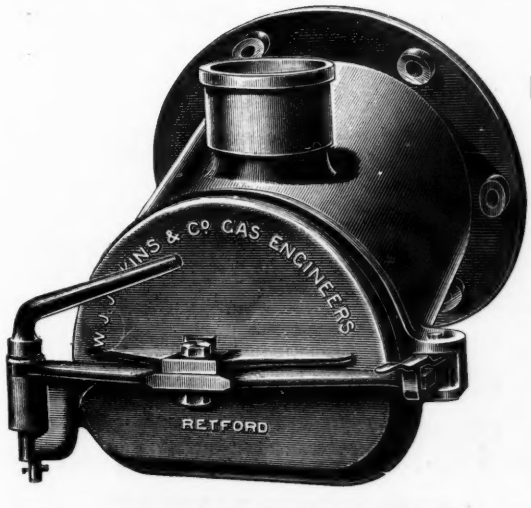
WRITE FOR OUR ILLUSTRATED CATALOGUE WITH FURTHER INFORMATION.

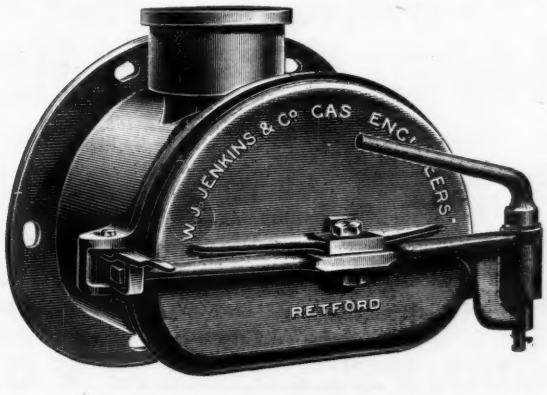
WARNING: As we hold the Master Patents covering the COILING OF SUPPLY-PIPES to obtain a resilient bearing to neutralize the damaging effect of Shock or Vibration on the Mantles of Incandescent Burners, we shall not hesitate to immediately INSTITUTE PROCEEDINGS AGAINST ANYONE INFRINGING OUR RIGHTS.


"C" BURNER SUSPENDED WITH BYE-PASS OVERHEAD.

CLAY & WALMSLEY
(Late W. R. CLAY & CO.),
BOLTON, LANCASHIRE, ENG.
London Representatives: Messrs. H. GREENE & SONS, Ltd., 19, Farringdon Road.
Telegrams: "CLAYS, BOLTON." See "Journal," Dec. 13, 1898, p. 1358, & Jan. 17, 1899, p. 130.

MOUTHPIECES
WITH SELF-SEALING LIDS FOR
HORIZONTAL AND INCLINED RETORTS.





W. J. JENKINS & CO., LTD., RETFORD.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

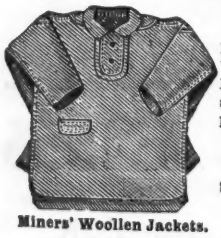
MACHINE-MADE GAS-RETORTS.

THOMAS BUGDEN,

Manufacturer of

Bellows for Inflating Gas-Bags. Made in various sizes.

Bellows made to inflate a 48-inch Bag under One Minute.



Miners' Woollen Jackets.

India-rubber Hose, Sheet, and Washers of every description, Leather Bands, Oils, &c., Diving and Wading Dresses, Waterproof Coats, Capes, and Sewer Boots.

Stokers' Mitts, from 14s. doz.

Special Air Tubing made for Gas Companies.

Gas-Bags for Mains.

71, GOSWELL ROAD, E.C., AND AT
256, PENTONVILLE ROAD, KING'S CROSS, N.

PETTIGREW'S PATENT

Sulphate of Ammonia Plant

ON THE CONTINUOUS SYSTEM

Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.

Old Systems easily and cheaply converted.

ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.

Makers of Self-Emptying Saturators.

Write for Particulars, Testimonials, and References to

GEO. PETTIGREW & Co.,

GAS AND CHEMICAL ENGINEERS,

MIDDLESBROUGH-ON-TEES.

THE

DENAYROUZE

LIGHT SYNDICATE,

THE

PIONEERS OF NO CHIMNEYS,

still hold their own on the market for the

HIGHEST CANDLE POWER

for each Cubic Foot of Gas at ordinary Pressures.

The Syndicate's Three-Light Cluster, governed to consume only 24 Cubic Feet of Gas per Hour, gives

550-CANDLE POWER,

which speaks for itself.

The Syndicate works under the

BANDSEPT PATENTS;

and Bandsept, who was the first to adopt the Injector Principle, is

STILL AHEAD OF ALL RIVALS;

and the combination of his Burners with Welsbach Mantles can be fearlessly tested against any others

ON THE MARKET.

Call and see these Burners

AT THE

OFFICES OF THE SYNDICATE,

28, VICTORIA STREET, S.W.

CHARLES EDWARD MASTERMAN,

General Manager.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

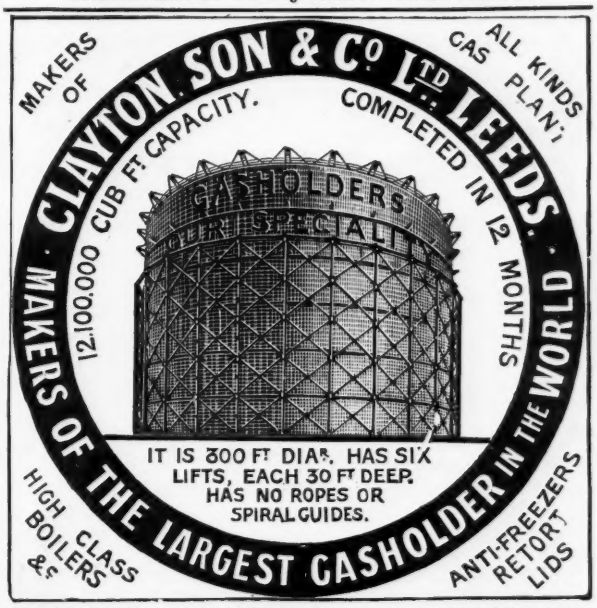
MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

MACKRELL BROS.,
Buslingthorpe Lane, LEEDS,
Manufacturers of
IMPROVED GAS-METER PERSIANS.

UNSURPASSED FOR QUALITY AND VALUE.


MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITY
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

London Office: 60, QUEEN VICTORIA STREET, E.C.
Telegraphic Addresses: "*GAS, LEEDS.*" "*ECLARAGE LONDON.*"

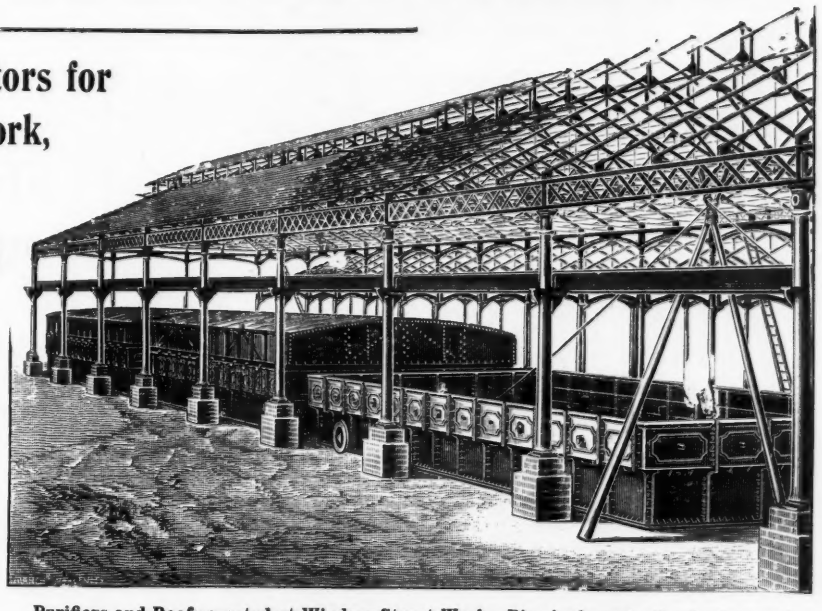
R. & J. DEMPSTER, LTD., GAS PLANT WORKS,

Telegraphic Address: "SCRUBBER, MANCHESTER." National Telephone Nos. 54 and 2296.

NEWTON HEATH, MANCHESTER.

Engineers and Contractors for Construction Ironwork,

ROOFS, GIRDERS, PURIFIERS, WASHERS, SCRUBBERS, CONDENSERS, GASHOLDERS, TANKS, RETORT-MOUNTINGS, VALVES, &c., &c.



Purifiers and Roofs erected at Windsor Street Works, Birmingham, to the Designs and under the supervision of C. HUNT, Esq., M.Inst.C.E.

London Office: 165, GRESHAM HOUSE, OLD BROAD STREET, E.C.

W. PARKINSON & CO.

PATENT

Equilibrium Governors.

A very large number are now at work; and all Engineers who have adopted them speak in unqualified terms of their great efficiency.

COUNTERBALANCE OR AIR VESSEL AS DESIRED, FITTED WITH SIX COLUMNS AND GIRDERS, WEIGHTS, OR WATER PRESSURE.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegrams: "INDEX."
Telephone No. 778 King's Cross

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegrams: "GASMETERS."
Telephone No. 1101.

[See also Advt. p. 848.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, April 4, 1899.